

Cleaner Greener Southern Tier

Regional Sustainability Plan

For Broome, Chemung, Chenango, Delaware, Schuyler, Steuben,
Tioga and Tompkins Counties, New York



April 2013

CLEANER GREENER SOUTHERN TIER REGIONAL SUSTAINABILITY PLAN

Prepared by the Cleaner Greener Southern Tier Planning Team: Tompkins County, Southern Tier Central Regional Planning and Development Board, Southern Tier East Regional Planning and Development Board, and ICF International, with funding and support from NYSERDA.

The Plan was prepared with the on-going support and guidance of the Southern Tier Regional Consortium.

The Southern Tier Regional Consortium

Tarik Abdelazim (City of Binghamton), Mina Amundsen (Cornell University), Jim Arey (Elmira-Chemung Transportation Council), Don Barber (Town of Caroline), Jack Benjamin (Three Rivers Development Corporation), Brian Bentley (GST BOCES), Marian Brown (Ithaca College), JoAnn Cornish (City of Ithaca), Jim Cummings (Shumaker Engineering), Fernando de Aragón (Ithaca-Tompkins Co. Transportation Council), Sandy DeJohn (Binghamton University), Steve Dennis (City of Corning), Amy Dlugos (Steuben Co.), Katharine Douglas (Corning Community College), Todd Dreyer (City of Norwich), Beth Egitto (Broome Co.), Herb Engman (Town of Ithaca), Frank Evangelisti (Broome Co.), Andy Fagan (Cooperative Extension of Tioga & Chemung), Nicole Franzese (Delaware Co.), Tom Gerow (Forest Rep.), Tom Giles (Agriculture Rep.), Nick Goldsmith (Town of Ithaca), Horst Graefe (GST BOCES), Claudia Haile (Corning Community College), Danielle Hautaniemi (Cornell Cooperative Extension of Schuyler Co.), Elaine Jardine (Tioga Co.), Donna Jones (Chenango Co.), Rocky Kambo (Schuyler Co.), Jill Koski (Southern Tier Economic Growth), Diane Lantz (STREDC), Kennie Leet (Broome Community College), Amelia LoDolce (City of Binghamton), Ed Marx (Tompkins Co.), George Miner (Southern Tier Economic Growth), Elaine Miller (Broome Co.), Erik Miller (Southern Tier East), Jen Miller (City of Elmira), Glenn Nealis (Delaware Co. Dept. of Economic Development), Steve Nicholson (Town of Caroline), Tim O’Hearn (Schuyler Co. Administrator), Randy Olthof (Chemung Co.), Cyndi Paddick (Binghamton Metropolitan Transportation Study), Steven Palmetier (Chenango Co.), Caroline Quidort (City of Binghamton), Heather Reynolds-Kaszynski (City of Hornell), Dan Roth (Cornell University), Jay Schissel (Elmira-Chemung Transportation Council), Ken Schlather (Cornell Cooperative Extension of Tompkins Co.), Linda Shumaker (Shumaker Engineering), Michael Stamm (Tompkins Co. Area Development), Tom Tranter (Corning Inc.), Jim Turner (Tompkins-Cortland Community College), Marcia Weber (Southern Tier Central), Lindsay Wickam (Agriculture Rep.).

The Planning Team

Tompkins County Planning Department

Ed Marx, Joan Jurkowich, Katherine Borgella, Leslie Schill

Southern Tier Central Regional Planning and Development Board

Marcia Weber, Victoria Ehlen

Southern Tier East Regional Planning and Development Board

Erik Miller, Jennifer Gregory

ICF International Team

Harrison Rue, Marian van Pelt, Kathleen Rooney, Philip Groth, Toby Mandel, Eva Hsu, Leslie Chinery
Rick Manning, RMLA; Dave Biggs and Mike Walsh, MetroQuest

FINAL DRAFT PENDING ENDORSEMENT BY THE
SOUTHERN TIER ECONOMIC DEVELOPMENT COUNCIL

Table of Contents

Introduction to the Plan.....	1
Executive Summary	3
Taking Action: The Implementation Strategy.....	11
Developing the Plan.....	62
Southern Tier Overview	68
Energy and Greenhouse Gas Emissions	75
Transportation.....	96
Land Use and Livable Communities.....	107
Economic Development.....	119
Working Lands and Open Space	131
Climate Change Adaptation	144
Water Management	156
Waste Management	167
Governance	175

Appendices

Volume 1

- Appendix A: Technical Approach
- Appendix B: Implementation Strategy
- Appendix C: GHG Benefits of the Implementation Strategy
- Appendix D: GHG Inventory Report and Workbook (workbook in separate spreadsheet)
- Appendix E: Goals, Indicators, and Targets
- Appendix F: Impact of Increased Natural Gas Production
- Appendix G: Supplemental Actions

Volume 2

- Appendix H: Baseline Assessment
- Appendix I: Best Practices
- Appendix J: Public Participation Summary
- Appendix K: List of Plans Reviewed

INTRODUCTION TO THE PLAN

The Southern Tier Region has magnificent natural features, productive farmlands, a capable and available workforce, and world-class universities and businesses. At the same time, the Region faces significant challenges in the areas of economic development, affordable living, land use, natural disasters, and natural resource protection. Since these issues relate to one another in complex ways, a comprehensive approach to sustainability planning is necessary. Understanding this need for a regional, integrated approach, community leaders came together to produce the Cleaner Greener Southern Tier Regional Sustainability Plan to revitalize the Region by creating a vibrant, resilient community that will support us, our children, and their children into the future.

The Cleaner Greener Southern Tier Regional Sustainability Plan promotes a future that is economically prosperous, environmentally sound, and socially responsible. This Plan is grounded in the strengths and challenges of the Southern Tier and builds upon success stories in the Region, supplemented with model programs and best practices that have proven to be effective elsewhere.

Cleaner Greener Communities Program

The preparation of this Plan was made possible by significant financial support from the New York State Cleaner, Greener Communities Program.

The Cleaner, Greener Communities Program was announced by Governor Andrew M. Cuomo in his 2011 State of the State address. The Program, which is administered by the New York State Energy Research and Development Authority (NYSERDA), provides \$100 million in funding to help New York's ten regions establish sustainability plans and adopt smart growth practices. Because progress begins with good planning, Phase One of the Cleaner, Greener Communities Program provided \$1 million in funding to help the Southern Tier create a comprehensive sustainability plan.

Phase Two provides up to \$90 million toward regional projects statewide that support the regional sustainability goals identified during the planning process and provide the greatest opportunity to reduce greenhouse gas emissions, save energy, and deploy renewable energy, while improving the economic and environmental health of our communities. Phase Two is expected to launch in 2013.

The plans that result from the Cleaner, Greener Communities Program will establish a statewide sustainability planning framework that will aid in statewide infrastructure investment decision making. The regional sustainability plans outline specific and tangible actions to reduce greenhouse gas emissions; inform municipal land use policies; serve as a basis for local government infrastructure decision making; and help guide infrastructure investment of both public and private resources.

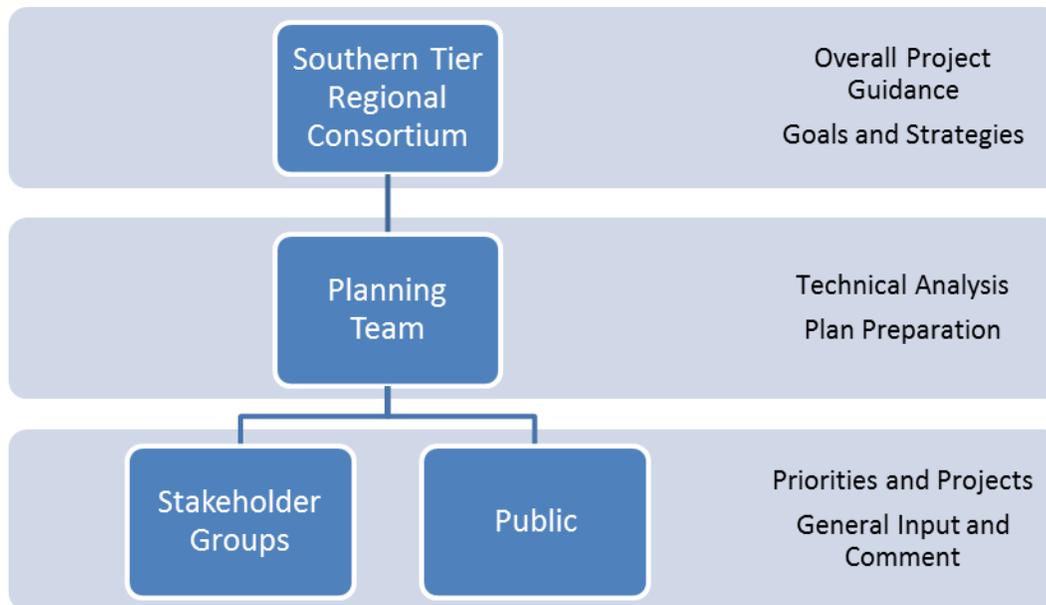
The Cleaner Greener Southern Tier plan, in accordance with Cleaner, Greener Program guidelines, includes a greenhouse gas emissions baseline inventory, identifies short-term and long-term implementation strategies to meet the emissions goals, and establishes metrics for tracking regional progress. The Plan also addresses other issues closely related to achieving the emissions goal: sustainable economic development, affordable living, natural resource protection, and land use and infrastructure.

Community Involvement

The immediate impetus for the preparation of this Plan was the availability of support from NYSERDA and the potential for additional funds to take action to help make the Plan a reality. Many entities within the Region were already working together to address common problems including the loss of manufacturing jobs, chronic flooding, affordable housing, and protection of valued natural resources.

The Plan was developed by a Planning Team consisting of three planning agencies: the Southern Tier Central Regional Planning and Development Board, the Southern Tier East Regional Planning and Development Board, and the Tompkins County Planning Department, and a planning consultant, ICF Inc.

The Southern Tier Regional Consortium (Consortium) was formed to guide the Planning Team as it prepared this Plan. Consortium members included representatives of some of the organizations that would need to implement the Plan: county and city governments, regional and transportation planning agencies, the Regional Economic Development Council (REDC) and economic development agencies, universities and colleges, and cooperative extensions. The Consortium, with its variety of perspectives, provided overall project guidance and, more specifically, identified the goals and the specific strategies that were included in the Plan.



However, a truly community effort requires the broader and more diverse voices of the public. So, in addition to the Consortium, direct public involvement was provided at several stages in plan preparation. Public meetings were held throughout the region early in the process to introduce the Cleaner Greener Southern Tier project and gather input on the Region's priorities, strengths, and opportunities. A website was also available to the public to provide input on the Plan's goals and proposed action items.

As specific implementation actions were identified and developed by the public and the Planning Team, stakeholder group workshops and public meetings were held to obtain feedback. Stakeholder workshops addressed economic development; transportation; waste management; water and wastewater treatment; energy; livable communities and housing; working lands, open space, local food, and agriculture; and university, educational innovation, and energy technology. Participants invited to the stakeholder workshops included representatives from throughout the region with significant experience and/or expertise in the topic area. These stakeholder groups included representatives from many of the organizations and agencies that would be instrumental in implementing the Priority Actions identified in the Plan. These individuals would likely constitute the nucleus of the ad hoc working groups formed to direct projects and programs within the Region.

EXECUTIVE SUMMARY

The Cleaner Greener Southern Tier Regional Sustainability Plan establishes 18 goals and outlines a detailed strategy for a future that is economically prosperous, environmentally sound, and socially responsible. This plan is grounded in the strengths and challenges of the Southern Tier and builds upon success stories in the Region, supplemented with model programs and best practices that have proven to be effective elsewhere. Given sufficient funding, political will, empowered citizenry, and an engaged business community, all of the actions identified in this plan can be implemented and achieved with existing technologies. Innovation and new technologies could allow the Region to take even greater strides toward reaching our goals.



The Plan's implementation strategy discusses 65 actions that together have the potential to reduce regional greenhouse gas (GHG) emissions by over 32 percent within 20 years (and 35 percent by including the impacts of already-issued Federal CAFE standards to increase fuel efficiency in vehicles sold in the United States). Twenty-two of these actions are identified as priorities for the next several years. In addition to the actions included in the plan, 77 supplemental actions were identified in this planning process. These actions were deemed not to be as important for implementation at this time, though they have the potential for helping the Region meet GHG emission reduction or other sustainability goals in the future. Many of them also support priority actions. It is likely that many of these supplemental actions will eventually need to be pursued to meet the long-range New York State goal of an 80 percent reduction in emissions from 1990 levels by 2050.

As envisioned in this plan the Southern Tier Region of the future will be a place with revitalized cities, villages and hamlets that anchor a reinvigorated urban and rural economy based on good paying jobs. A place where energy needs are increasingly supplied or reduced by conservation, efficiency, renewable technologies and smart development; where new transportation and housing options meet the needs of the region's changing population and contribute to an enhanced quality of life; and where natural systems are protected and greenhouse gas emissions substantially reduced.

The regional sustainability goals addressed by actions in the Plan's nine topic areas are outlined below.

Energy and Greenhouse Gas Emissions

1. Reduce building energy use.
2. Develop, produce, and deploy local renewable energy sources and advanced technologies across the Southern Tier.

Transportation

3. Create a regional multi-modal transportation system that offers real transportation choice, reduced costs and impacts, and improved health.
4. Reduce fossil fuel consumption and GHG emissions from transportation by reducing vehicle miles traveled, increasing efficiency, improving system operations, and transitioning to less carbon intensive fuels and power sources.

Land Use and Livable Communities

5. Strengthen and revitalize existing cities, villages, and hamlets.
6. Support development of housing that is energy and location efficient and offers choices to reflect changing demographics.

Economic Development

7. Create and retain more good paying jobs by building on the Southern Tier's regional strengths, including advanced energy and transportation technologies, globally-competitive industry, and workforce development and technology transfer partnerships with educational institutions.
8. Support tourism industry development with coordinated marketing, preservation, and enhancement of historic, cultural, educational, and natural resources and events.
9. Support farming and related businesses to reinvigorate the rural economy, enhance residents' incomes and standards of living, and promote local food and agriculture.

Working Lands and Open Space

10. Promote best management of fields, forests, and farmland to keep working lands in production, protect natural resources, and increase carbon sequestration.
11. Preserve and connect natural resources, open spaces, and access to waterways, to protect regional environment, ecology, habitat and scenic areas, and support outdoor recreation.

Climate Adaptation

12. Identify and plan for the economic, environmental, and social impacts of climate change.
13. Minimize flood losses by preserving and enhancing floodplains and wetlands, and by limiting development in flood-prone areas.

Water Management

14. Efficiently manage and upgrade existing water, sewer, and other utility infrastructure to support compact development and reduce energy use.
15. Improve and protect water quality and quantity.

Waste Management

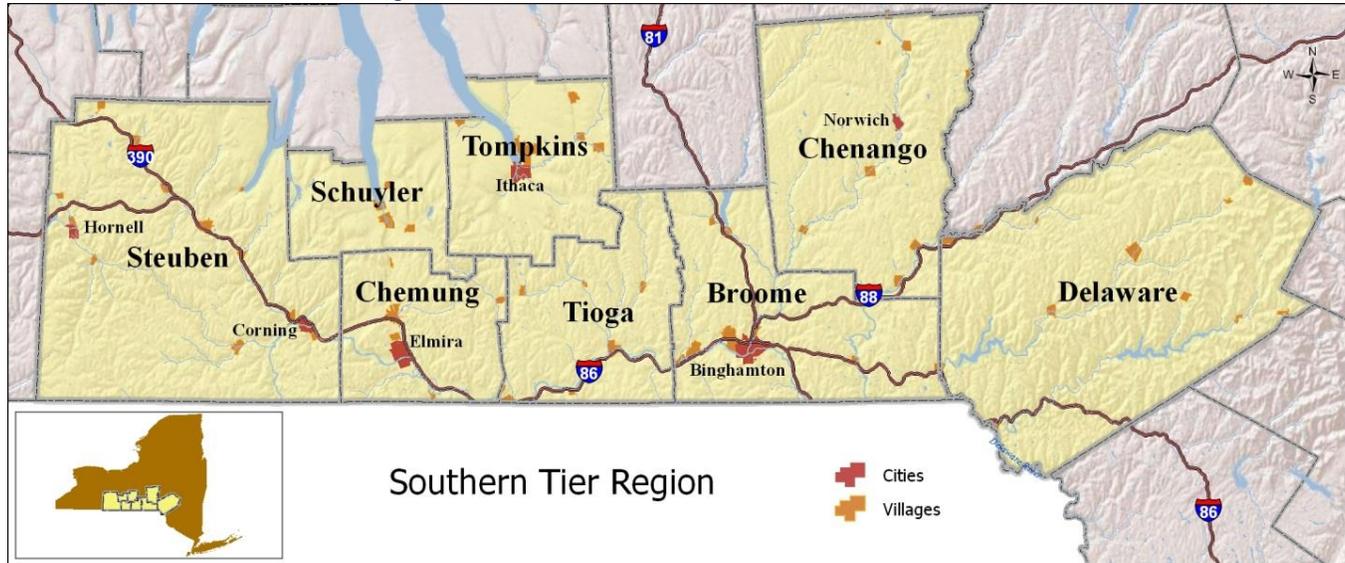
16. Promote innovative waste reduction and management strategies that reduce the amount of material disposed of at landfills.

Governance

17. Increase collaboration among regional agencies, institutions, and local governments.
18. Increase fiscal efficiency and effectiveness in local government through energy and waste reduction, coordinated investments, and integrated planning.

The Challenge of a New Region

While the Southern Tier Region has magnificent natural features, productive farmlands, a capable and available workforce, and world-class universities and businesses, there are real challenges to planning for the newly created region. The Plan acknowledges the challenges facing the Southern Tier as a region, including recent declines in population in many areas and a manufacturing sector that, while still a significant driver of the regional economy, has experienced substantial job loss over the past several decades. Incomes are stagnant and jobs too few, resulting in out-migration of young people and an aging population that will require more services in years to come, even as tax revenues are strained.

FIGURE 1 ■ The Southern Tier Region

The planning region for this project, as established by the State of New York, also presents a challenge as this group of eight counties has not previously functioned as a planning region. Two regional planning agencies serve portions of the region, one of which includes counties outside the region. New York State agencies have regional boundaries that divide the eight counties in no less than three different ways. Prior to the establishment of the Regional Economic Development Council in 2011 and the Southern Tier Regional Consortium in 2012, no institutions existed through which these eight counties had any regular interaction. The Southern Tier is a largely rural region, which also poses certain challenges in reducing energy use and GHG emissions. A dispersed population is more dependent on individual vehicles for transportation. Many rural counties, towns, and villages have very limited staff and tax base. This makes local action to tackle the large challenges around energy and climate change difficult.

Promise for the Future

Nonetheless, the Region, encompassing the eight counties of Broome, Chemung, Chenango, Delaware, Schuyler, Steuben, Tioga, and Tompkins, has the potential for a truly sustainable and prosperous future. There is already strong leadership within the Region dedicated to the development of energy efficiency and renewable energy solutions, with significant existing examples of wind, biomass, and solar energy potential to build upon. The Southern Tier Regional Economic Development Council has developed an innovative strategy for economic revitalization. This plan has built upon the analysis of the regional economy presented in that strategy. The Region has many assets, including world class universities and Fortune 500 companies, and is blessed with substantial natural resources that can foster rural economic revitalization.



Established corporations and technology start-ups can both benefit from collaboration with our research universities. Both the agriculture and forestry sectors have the potential to grow significantly and contribute to meaningful GHG reductions in the process. Undertaking the huge tasks of upgrading the energy efficiency of our buildings and growing the renewable energy supply of the future offers the potential to create thousands of stable, good-paying jobs.

Although a largely rural region, the Southern Tier has traditionally vibrant cities that are striving to make a comeback and villages that can serve as vital anchors for the rural economy while offering a way of life that is less energy consumptive and meets the needs of our aging population. Revitalization of our cities may also provide housing options that will help retain young people seeking urban living options, while offering seniors new housing options to help them stay active and socially connected. The Plan calls for reinvestment in these cities and villages to attract increased population, while serving that population with multi-modal transportation systems, new and rehabilitated housing in walkable and bikeable neighborhoods, and businesses that create new jobs and sustainable economic development.

The Region also has extensive water resources with four major river systems, three Finger Lakes, and valuable groundwater resources. Protecting and improving the quality of these resources is seen as pivotal to the Region's future and the health of its residents. Innovation in the operation of water and wastewater treatment facilities, already demonstrated at some facilities within the Region, offers the potential to dramatically reduce energy use, costs, and GHG emissions associated with these facilities. The waters of the Region also pose a serious threat with recent extremely destructive floods and the risk that these will increase in frequency with climate change. Protecting watersheds' natural capacity to retain stormwater and keeping development and people out of harm's way are important strategies for a sustainable future.

How We Propose to Get There

Reducing GHG emissions and protecting vital natural resources while revitalizing a struggling economy and enhancing the quality of life for the Region's residents requires strategies that are mutually reinforcing. While the plan and implementation strategy is divided into nine topic areas, there are many interactions and opportunities for synergies between actions identified in each of these areas. This plan also overlaps with and reinforces the Regional Economic Development Council's Strategic Economic Development Plan in a number of key areas including creation of thousands of jobs in the energy efficiency and renewable energy sectors, revitalization of our downtowns and rural population centers, expansion of agriculture and forestry sectors with new value added products, and expanding broadband communications infrastructure.

Energy and Greenhouse Gas Emissions. We propose to address our energy future by a concerted effort to make existing buildings more energy efficient while ramping up deployment of an array of renewable energy sources that have already been proven to be technologically feasible within the Region. From major wind farms in Steuben County to increasing solar photovoltaic capacity in Tompkins and Broome Counties and the largest biomass pellet production facility in the Northeast U.S. in Delaware County, major renewable energy sources are already taking hold in the Southern Tier. These will be complemented by anaerobic digestion methane capture and use on dairy farms, as demonstrated in Tioga County and in wastewater treatment facilities as is currently underway in the Ithaca Area Wastewater Treatment Plant. We also have great examples of vastly improved efficiency in energy systems, including combined heat and power and district energy as demonstrated at the Cornell University campus and currently in the planning stages in communities and facilities throughout the Region. In the coming years, we expect to see additional pilot projects demonstrating the feasibility of widespread deployment of these and other efficiency and renewable energy options. This two-pronged approach to energy efficiency and renewable energy is critical as energy consumption in buildings is responsible for almost half of all emissions in the Region.

TABLE 1 ■ Total 2010 Southern Tier Emissions, by Source (MTCO_{2e})

	GHG Emissions	Percent
Electricity Consumption	1,546,748	16%
Residential Buildings	602,494	6%
Commercial Buildings	552,146	6%
Industrial Buildings	392,108	4%
Stationary Energy Consumption	3,032,276	31%
Residential Buildings	1,371,583	14%
Commercial Buildings	780,913	8%
Industrial Buildings	879,779	9%
Mobile Energy Consumption	3,601,352	37%
On-road transportation (i.e., Cars and trucks)	3,193,240	32%
Off-road (Agriculture and Recreation vehicles)	343,415	3%
Marine (Boats)	54,581	1%
Rail (Freight)	29,142	0%
Energy Supply (Production, Transmission, and Distribution Losses)	380,243	4%
Waste	372,982	4%
Solid Waste Scope 3 - Waste Generation	308,976	3%
Wastewater Treatment	64,007	1%
Industrial Processes	268,581	3%
Agriculture	651,389	7%
Gross Emissions	9,853,570	

TABLE 2 ■ Additional Sources Not Included in Southern Tier Baseline Emissions (MTCO_{2e})

	GHG Emissions
Electricity Generation	2,156,136
Air Travel	35,555
Solid Waste Scope 1 - Landfills	235,569
Land Use, Land Use Change, and Forestry	(6,922,505)

Transportation. The second major use of energy and contributor to GHG emissions is in the transportation sector. Here we are relying on improved transit systems attracting increasing numbers of bus riders, improved and better-connected facilities for walking and biking, and a transition to more fuel efficient automobiles to both improve transportation options available to residents and reduce energy consumption for transportation. We recognize the challenges posed by trying to transform a transportation system in a rural region that is heavily dependent on the automobile for personal mobility and trucks for moving goods. However, these strategies will be coupled with policies to revitalize our cities and villages, making it much more feasible for the increasing populations of these vibrant downtowns to take advantage of diverse transportation options.

Land Use and Livable Communities. Along with more walkable neighborhoods and transportation choices, creating more livable communities will require reinvestment in our existing buildings. Urban and rural revitalization can be spurred by investment to make buildings more energy efficient. The majority of construction dollars tend to stay in the local economy and benefit the community by recirculating and not leaving the Region. New and rehabilitated housing in population centers can better serve the needs of our aging population, as well as attract the younger entrants into the workforce who will be



needed to sustain our economic future and are often looking for urban housing options that are not currently offered.

Economic Development. Although the Southern Tier has suffered some economic decline in recent decades, there is reason to be optimistic about our future. The Region includes two premier research universities in Cornell and Binghamton, as well as a host of fine undergraduate colleges and community colleges that can supply the entrepreneurs, managers, and skilled workers of the future. Major industrial firms, like Corning Incorporated and Lockheed Martin, are leaders in innovation and are on the cutting edge of developing new technologies. Our agricultural sector is also a source of innovation and new investment, perhaps most notably Chobani Yogurt in Norwich, now the maker of America's number one selling yogurt brand, but also demonstrated by scores of smaller operations developing new value-added high-quality agricultural products and opening up new markets both locally and regionally.



Working Lands and Open Space. Key to the economic future of this rural region is the quality of the land and waters that sustain not only the people's economic prosperity but also their health and spirit. Most of the Southern Tier is an Appalachian landscape of high hills cut by powerful rivers forming broad valleys. It is also the southern gateway to the Finger Lakes, including the southern ends of the largest and most central of the eleven lakes, Keuka, Seneca, and Cayuga. The land is predominantly blanketed with a vast forest encompassing the majority of the land and with agricultural fields covering more than one million acres. These lands provide multiple benefits including forest and agricultural products, tourism, recreation, and water supplies for domestic and commercial use. There are growing efforts to conserve and manage these resources and, among the many other benefits of doing so, offsetting carbon emissions from the Region. The sequestration benefits of actions quantified in this plan are equivalent to nine percent of the Region's emissions, though more study is needed to better characterize and maximize opportunities in this sector.

Climate Adaptation. These lands will inevitably be impacted by climate change. The Southern Tier has experienced devastating floods in recent years which, according to recent climate analysis, are predicted to worsen in the future. Floodplain and watershed management are critical in order to avoid as much destruction as possible from such future events. Hazard mitigation planning is starting to take this and other likely impacts of climate change into account in the Region, offering models to follow to adapt our agriculture, forest management, infrastructure planning, and public health efforts to respond to the changes that are likely to come.

Water Management. As mentioned above, water is perhaps our most precious resource. One of the most important functions of government in the Region is to protect the quality of streams, rivers, lakes, and aquifers and to provide residents with clean water for domestic and commercial use. Together, water and wastewater treatment facilities comprise one of the largest energy users that local governments are responsible for and offer a significant opportunity to reduce costs and GHG emissions through adoption of more efficient technologies and processes. Energy efficiency savings of 15 to 30 percent are readily achievable by incorporating innovative approaches to energy efficiency into facilities and plant processes, while the installation of renewable technologies, like methane capture at wastewater treatment plants, can create the energy to run the plants while simultaneously reducing net energy use and emissions by as much as 70 percent.

Waste Management. Solid waste is also an area where better management of our resources can lead to energy and cost savings and GHG emission reductions. Building on successes already demonstrated in the Region, increased efforts to reduce, reuse, and recycle waste can help us greatly minimize the amount of waste that needs to be landfilled, resulting in less energy needed for transportation and a reduction in methane released from landfills.

Methane is a powerful greenhouse gas with at least 20 (over 100 years) to 70 (over 20 years) times the impact of carbon dioxide emissions on global warming¹. Some landfills in the Region are already leading the way by capturing methane and using it to generate electricity or thermal energy, thus reducing emissions.

Measuring Our Progress

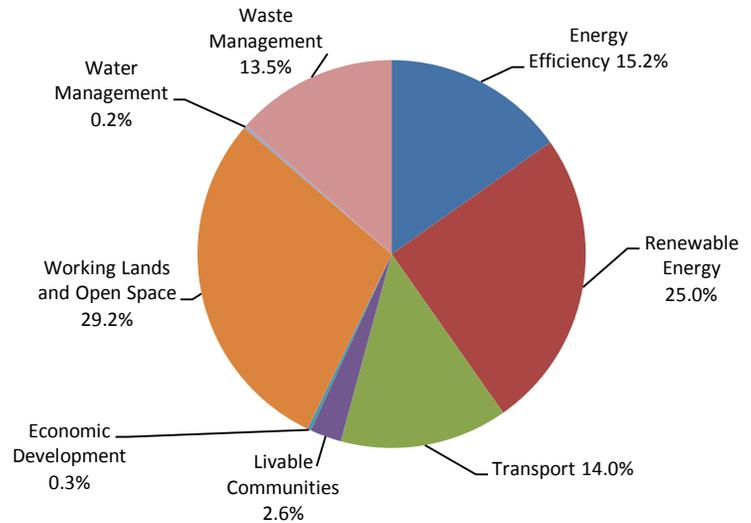
In order to measure progress toward reaching the goals outlined in the Plan, specific targets have been established for indicators that use readily available data and which the Region has the capability to measure and track over time based on current available resources. For example, the Region has currently chosen not to establish a formal indicator for GHG emissions based on uncertainty regarding data availability and capacity. However, if the data, infrastructure, and funding were made available to conduct future GHG inventories, the Region would be able to track progress toward meeting its GHG emissions reduction target of 35 percent. Within the next twenty years we hope to:

- Reduce energy consumption in buildings by 40 percent in the residential and commercial sectors and 30 percent in the industrial sector.
- Increase the percent of commuters walking, biking, using transit, or ride-sharing from 19 percent to 28 percent.
- Decrease regional gasoline and diesel fuel consumption by 40 percent.
- Increase the percentage of residents living in cities and villages from 38 percent to 45 percent.
- Increase the percentage of housing units in cities and villages that are affordable to low- and moderate-income households from 37 percent to 42 percent.
- Increase the average wage in the Southern Tier to equal the national average wage. (Currently the average weekly wage of \$777 in the Region is 15 percent lower than the national average of \$899/week.)
- Increase total cash receipts from farm sales from \$338 million to \$497 million.
- Enroll an additional 100,000 acres of agricultural and forest lands in certified sustainable management programs.
- Add 30,000 acres of protected natural lands.
- Develop Hazard Mitigation Plans in all eight counties that discuss climate change impacts and vulnerabilities, and in at least six suggest adaptation strategies to reduce such vulnerabilities.
- Increase participation in the Community Rating System of the National Flood Insurance Program (NFIP) to 100 percent of communities with more than 100 NFIP policies in effect and 50 percent of those with 50-100 policies.
- Reduce the number of water bodies with quality that impairs the ability to use the water for desired activities from nine currently to no more than three -- a 66 percent reduction.
- Reduce the amount of solid waste generated per capita by 50 percent from 4 lbs. to 2 lbs. per day.
- Enroll 100 percent of counties and 50 percent of local municipalities in the New York State Climate Smart Communities Program.

¹ See, e.g., Shindell DT, Faluvegi G, Koch DM, Schmidt GA, Unger N, and Bauer SE (2009). Improved attribution of climate forcing to emissions. *Science* 326: 716-718.

Sixty-five actions have been developed to assist in reaching these measurable targets, as well as attaining less easily quantifiable goals. These actions, if implemented over the next 20 years, will lead to a 32 percent reduction in GHG emissions in the Region without any new Federal or State policies beyond those established in current laws, regulations, and programs (although additional project-level funding may be required); a 35 percent reduction would be achieved if coupled with current Federal CAFE standards. Coupled with more Federal involvement or other State initiatives, the goals of a 40 percent reduction in 20 years and an 80 percent reduction by 2050 could be within reach.

FIGURE 2 ■ GHG Reductions by Topic Area



Making It Happen

Still, turning these proposed regional actions into actual progress will require collaboration among all of the Region's local governments, institutions, agencies, businesses, developers, and residents, as well as with State agencies. This is a daunting prospect for a region with no history of such efforts across all eight counties. The Southern Tier Regional Consortium, which was developed for this planning process and composed of representatives from many of these entities, is a start toward such regional collaboration. The Planning Team of the Southern Tier East Regional Planning and Development Board, Southern Tier Central Regional Planning and Development Board, and Tompkins County has also begun to develop cooperative relationships. In addition, stakeholder meetings facilitated by this planning process have brought together individuals and agencies from around the Region who share common interests in the topic areas of this Plan. We hope that the participants in the stakeholder meetings will form the core membership of the future ad hoc working groups that will move these actions forward and develop specific demonstration or pilot projects and programs from which others can learn. In other cases, we aim to build on projects that are already successful by sharing those stories broadly throughout the Region and helping others to replicate those successes.

This Plan provides a path toward a sustainable future in which economic prosperity is inextricably linked to improved environmental quality, health, and social well-being for all residents of the Southern Tier. We know that course corrections will almost certainly be necessary as conditions change and unforeseen challenges and opportunities emerge. We believe that the Top 22 priority actions described on the following pages offer the best opportunity to make immediate progress along the course we have charted.

TAKING ACTION: THE IMPLEMENTATION STRATEGY

The Implementation Strategy will help Southern Tier communities achieve regional sustainability goals in the Plan's nine topic areas. The Implementation Strategy includes a total of 142 actions. These are organized in three groups:

- **22 short-term Top Actions** (detailed on the following pages in this section)
- **43 other priority actions** (described at the end of each topic area chapter and in Appendix B)
- **77 long-term supplemental actions** (described in Appendix G, Supplemental Actions)

Selecting the Actions

These actions included in the Implementation Strategy were developed and refined through a comprehensive public process, based on regional stakeholder, resident, and business input; an assessment of baseline conditions; best practices research; model programs review; and technical analysis.

Initially, through two intensive weeks of public outreach early in the planning process, an interactive project website, and a review of over 150 plans from the Southern Tier, nearly 200 potential actions were identified.



These 200 potential actions were evaluated and a draft implementation strategy was prepared for presentation to stakeholders and the general public. Actions were included in the draft based on their GHG reduction potential, direct and indirect benefits, barriers to implementation, ability to help meet goals, and the anticipated ability of the action to be implemented in the Region by potential leads and partners. Through a series of public workshops, online exercises, topic area expert stakeholder groups, and a Consortium meeting, further prioritization and refinement of the draft actions resulted in the final Implementation Strategy.

For each of the Top 22 Actions and the 43 other priority actions, estimates of GHG reduction benefits were calculated. Since high GHG reduction benefits were a primary selection factor, half of the Top 22 Actions are in the Energy and Transportation topic areas, where the majority of GHG emissions are generated. The annual GHG reductions from the Top 22 Actions are estimated to be 2,034,000 MTCO₂e annually by 2032. This represents 64% of the anticipated reductions in GHG emissions for the 65 priority actions.

Barriers

There are several barriers to implementation that are common to many of the actions. Lack of funding, both short-term and long-term, is a common concern. While some of the actions pay for themselves in the long-term, capital funding in the short-term can be difficult to find.

The nature of the Southern Tier makes coordinated implementation more difficult than in a region with a single large central city, a single regional planning agency and Metropolitan Planning Organization (MPO), and centralized economic development and workforce investment boards. The Southern Tier has two regional planning agencies, three MPOs, and multiple transit systems, economic development agencies, and workforce boards. Cornell Cooperative Extension (CCE) is identified as a potential lead on many of the actions because it is the only organization actively working throughout the Region that has a mission to “help solve real-life problems by

transforming and improving New York families, farms, businesses and communities.”² Tapping the CCE system of extension educators will be critical in developing programs and educating the public around the issues identified in this Plan.

There are also a multitude of local governments with which to coordinate activities; the Southern Tier has eight counties, six cities, 59 villages, and 125 towns. Many municipalities have a small population and tax base, and, thus, have exceedingly limited resources. Providing local funding and staff time for implementation of this plan will be a challenge for many villages and towns. Several municipalities have not adopted land use regulations.

The diversity of geography and character of urban and rural communities means that many actions will need to be adjusted to fit a multitude of situations and, thus, cannot be applied uniformly throughout the Region.

Given the number and variety of ad hoc working groups needed to implement some of the action items, it will be challenging to manage and implement this Plan. Much of this Plan relies on replicating small successes and expanding them throughout the Region. The Region can build on the work of organizations and individuals that have found success. Also, by creating ad hoc working groups with short-term focused tasks, great strides can be made. Managing and coordinating all these efforts will be a big challenge for long-term success.

The Actions

The following chart lists the Top 22 Actions along with the 43 other priority actions, and shows which of the Plan’s 18 goals they will help to further. This is followed by a detailed description of each of the Top 22 Actions including an explanation of the proposed action, benefits, potential barriers, next steps, funding needs, potential partners, and examples that have been implemented in the Region.

² www.cce.cornell.edu The CCE Education System extends Cornell University’s land-grant programs to citizens all across New York State. With a presence in every county and New York City, CCE puts research into practice by providing high value educational programs and university-backed resources that help solve real-life problems, transforming and improving New York families, farms, businesses and communities.

IMPLEMENTATION STRATEGY: ACHIEVING THE SOUTHERN TIER'S SUSTAINABILITY GOALS

Action Items, abbreviated	Energy & GHG Emissions		Transportation		Land Use & Livable Communities		Economic Development		Working Lands & Open Space		Climate Adaptation		Water Management		Waste Mgt		Governance	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
GOALS:																		
ENERGY AND GHG EMISSIONS																		
★ 1 - Energy efficiency & renewables in buildings	X	X			X		X											X
★ 2 - Energy road map	X			X				X				X		X		X	X	X
★ 3 - Financing options for renewables and energy efficiency	X	X			X	X	X										X	X
★ 4 - Energy efficiency upgrades in government facilities	X						X						X	X	X	X	X	X
★ 5 - Solar photovoltaic & solar thermal systems	X	X					X						X					X
★ 6 - Mid-scale wind projects	X					X		X										
★ 7 - Anaerobic digester systems	X					X									X			
★ 8 - Geothermal heat pump systems	X	X																
★ 9 - Transition power and thermal generation to sustainable fuel	X	X						X		X								X
★ 10 - Biomass for heating	X	X						X										X
★ 11 - Combined heat and power	X				X	X											X	X
TRANSPORTATION																		
★ 12 - Connectivity of pedestrian, bike, and transit routes			X	X	X	X		X		X								X
★ 13 - Inter-city bus service, expanded cross-regional transit, etc.			X	X														X
★ 14 - Way2Go and other TDM programs			X	X														X
★ 15 - Carsharing programs			X	X	X	X												
★ 16 - Parking policies, codes, and pricing			X	X	X		X										X	X
★ 17 - Green fleet policies				X														X
★ 18 - Electric vehicle & alternative fuel infrastructure				X														X
LAND USE AND LIVABLE COMMUNITIES																		
★ 19 - Investment in cities, villages, and hamlets			X	X	X	X	X	X						X				X
★ 20 - Financing for community revitalization			X	X	X	X	X	X						X				X
★ 21 - Downtown development at appropriate densities	X	X	X	X	X	X	X	X						X				X
★ 22 - Redevelopment of strategic sites and vacant properties				X	X		X					X		X				X
★ 23 - Update local land use regulations and provide assistance		X		X	X	X						X		X				X
★ 24 - Affordable housing needs and target areas				X	X	X	X	X						X				X
★ 25 - Rehabilitate housing for low-to-mod. income households	X			X	X	X												X
★ 26 - Convert upper floors to residential uses			X	X	X	X								X				X
★ 27 - New energy-efficient affordable housing	X			X	X	X												X
ECONOMIC DEVELOPMENT																		
★ 28 - Energy Workforce Development Initiative	X	X				X	X	X										X
★ 29 - Contractors for energy efficiency work	X	X				X	X	X										X
★ 30 - Regional Broadband Communication Projects				X			X	X	X									X
★ 31 - Targeted investment in local businesses					X		X	X	X									X
★ 32 - University-industry connections for workforce development							X	X	X									X
★ 33 - Culinary and agri-tourism opportunities							X	X	X	X								X
★ 34 - Educational and green tourism							X	X	X	X	X					X	X	X
★ 35 - Food Hubs for local products				X	X		X	X	X	X	X							X
★ 36 - Local food purchasing policies				X			X	X	X	X	X							X

Top 22 Actions are indicated with a star. The list of goals can be found in the Executive Summary and in the Introduction.

IMPLEMENTATION STRATEGY: ACHIEVING THE SOUTHERN TIER'S SUSTAINABILITY GOALS

Action Items, abbreviated	Energy & GHG Emissions		Transportation		Land Use & Livable Communities		Economic Development		Working Lands & Open Space		Climate Adaptation		Water Management		Waste Mgt		Governance	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
GOALS:																		
WORKING LANDS AND OPEN SPACE																		
★ 37 - Sustainable forestry and wood products		X					X		X	X	X	X	X	X			X	
38 - Regional biomass consortium								X	X	X							X	
39 - Best management Practices on farms								X	X	X				X	X			
40 - New farm startups and farm transfers to next generation								X	X	X							X	
41 - Farm-based renewable energy production		X						X	X	X								
42 - Priority conservation and agricultural protection areas				X	X	X			X	X	X	X	X	X			X	X
43 - Priority trail segments			X	X	X	X	X			X	X						X	
CLIMATE CHANGE AND ADAPTATION																		
★ 44 - Climate mitigation strategies in Hazard Mitigation Plans				X	X						X	X					X	X
45 - Viability of current & potential future crops								X	X	X	X	X						
46 - Update Flood Insurance Rate Maps				X	X				X	X	X	X	X	X			X	X
47 - Conserve high risk floodplains									X	X	X	X	X	X			X	X
48 - Buffers for streams and wetlands								X	X	X	X	X	X	X			X	X
49 - Incentives for property owners to protect streams & buffers								X	X	X	X	X	X	X			X	X
WATER MANAGEMENT																		
50 - Energy efficiency and renewables for plant upgrades	X	X												X	X			X
★ 51 - Retrofits at major water and wastewater facilities	X	X										X	X	X	X			X
52 - Prioritize repair/replacement				X	X	X						X	X	X	X			X
53 - Green infrastructure and Low-Impact Development				X	X	X				X	X	X	X	X	X			X
54 - Stormwater drainage design & maintenance for roadways										X	X	X	X	X	X			X
55 - Local and county water quality strategies								X	X	X	X	X	X	X	X			X
WASTE MANAGEMENT																		
★ 56 - Expand Pay-As-You-Throw trash collection																X		X
57 - Reuse strategies								X	X	X						X		X
58 - Recycling									X	X						X		X
59 - Composting services								X	X	X						X		X
GOVERNANCE																		
60 - Southern Tier Regional Consortium																		X
61 - Planning and policy guidance documents	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
62 - Regular conferences and training	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
63 - Regional working groups	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
64 - Examples of existing efficient practices			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
65 - Climate Smart Communities program				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Top 22 Actions are indicated with a star. The list of goals can be found in the Executive Summary and in the Introduction.

ENERGY AND GREENHOUSE GAS EMISSIONS

Promote energy efficiency and renewable energy in residential and commercial buildings (*Action 1*)

Estimated GHG Reductions: 397,000 MTCO_{2e} Annually by 2032

First proposed in the Southern Tier Regional Economic Development Council's Strategic Plan

► Why Take This Action?

Southern Tier residents will benefit from a large-scale, region-wide program that provides education, financing, up-to-date information, and application assistance to homeowners and businesses interested in reducing their energy usage. This "Southern Tier Renewable Energy and Efficiency Initiative," first proposed in the Southern Tier Regional Economic Development Council's Regional Strategic Plan, will be an overarching, coordinated initiative under which a number of targeted efforts will be deployed to help consumers improve the energy efficiency of their buildings. It will also coordinate education, events, website content, and outreach based on community needs and could support and advertise local efforts to provide basic energy upgrades and weatherization services.



DER construction- installing roof insulation (courtesy of Dave Legg, National Grid).

Reducing energy use and improving energy efficiency in existing buildings is a key strategy in this Plan, and is projected to result in some of the largest GHG reductions identified in this Plan. Starting with a focus on energy efficiency, the Initiative will help consumers take the first step in reducing energy usage. Once energy efficiency measures are in place, appropriate renewable technologies can be installed to harness new energy sources. Once the Initiative is implemented, fossil fuel consumption and related GHG emissions will be reduced and the region will experience greater energy stability and independence.

By fostering this range of energy initiatives, local governments and partners can have a direct role in reducing GHG emissions by assisting in mass retrofit and renewable technology deployment. Jobs will be created through an increasing demand for retrofit and clean energy projects, particularly in the trades, including electricians, HVAC, and renewable technology work. If expanded to the fullest, 232 jobs annually could be created, averaged over the lifetime of the project. The Initiative will increase elected officials' and the public's understanding and awareness about the financial and operational aspects of renewable energy and energy efficiency.

► What Can Be Done?

The Initiative will be established as an avenue for organizations and businesses that have programs, services, products and/or educational materials to partner with Southern Tier leadership to engage the community and accelerate action. The Initiative will also act as a coordinating and vetting body for community education, events, website content and outreach, and could support, advertise, coordinate, and fund local efforts to provide basic energy upgrades and weatherization services. Another main goal will be to identify community-specific barriers and share tools and resources that will help consumers take steps to improve the energy efficiency of their buildings by installing renewable energy infrastructure. The outreach could be modeled after the Cornell Cooperative Extension of Tompkins County's Retrofit Program Marketing Model, which is part of the Energy Leadership Program and has used education and marketing efforts to successfully promote home energy retrofits.

▶ **What are the Barriers to Taking This Action and How Will They be Overcome?**

- The principal barrier to taking this action in the Southern Tier is the lack of sufficient resources to carry out this work. The level of technical assistance that home and business owners need to understand and act on making energy investments is not now provided throughout the Region. This Initiative takes a holistic approach to this barrier by creating a one-stop shop for residents to learn about making energy efficiency or renewable investment decisions.
- The Southern Tier has existing examples of successful programs and strategies that address various aspects of this action. These programs have already begun to spread within the Region through the Cornell Cooperative Extension (CCE) network and other entities. Strong partnerships have formed between contractors, community leaders, educational agencies, and governments to develop methods to provide the required one-on-one assistance for homeowners and businesses. One example is CCE of Tompkins County's Energy Leadership Program, which has successfully engaged community leaders in Tompkins County and could be a model for expansion in the Region.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

Commercial and residential buildings account for 34 percent of the Southern Tier's regional GHG emissions. In combination with the other energy efficiency actions identified in this Plan, this action's GHG reduction will provide 75 percent progress toward the long term sustainability target of reducing onsite fuel and electricity consumption in residential and commercial buildings by 40%. Assuming that 2 percent of the residential and commercial building stock is retrofitted annually through energy efficiency programs, and these improvements result in a 30 percent reduction in energy consumption, this action will reduce GHG emissions by an estimated 397,000 MTCO₂e, or 12.5 percent of the Plan's estimated GHG reduction benefits.

▶ **Recommended Next Steps**

- Establish Initiative committee members or a core group of decision makers to expand the vision of the Initiative and determine organizational structure and initial activities.
- Investigate existing initiatives in the Southern Tier that may be worth expanding, promoting, leveraging, or creating partnerships to enhance the impact. Establish Year 1 Goals and budget. Determine available sources of funding and seek to obtain.
- Formally launch the Initiative.

▶ **Who are Potential Leads and Key Partners for This Action?**

Potential lead agencies include Cornell Cooperative Extension, businesses, and job training and economic development organizations. Key partners include NYSERDA, neighborhood organizations, community groups, and energy product vendors and service providers. Since many of these groups are already engaged in this work, the Initiative can build on these existing formal and informal networks and expand them throughout the Southern Tier.

▶ **How Would Funding be Used?**

Costs may include funding for development of educational and outreach materials, development of a website, and paid staff or contractors to carry out the Initiative. Some portion of the funding to create the website and outreach materials may be found in existing budgets of entities already working on these types of programs or through collaboration among entities. It will be more difficult to find funding to cover operational costs for full-time staff to spearhead this Initiative in the Region. Given its potential for job creation, the Initiative may be a good candidate for Appalachian Regional Commission grants, or state energy, workforce or economic development grants.

▶ **Examples and Potential Projects**

Although it was discontinued at the end of 2012, for over a decade the NYSERDA-funded New York Energy Smart Communities Program employed community coordinators throughout the state to promote NYSERDA's energy

efficiency and research and development programs. The coordinators built support for energy-efficiency and renewable energy projects by providing forums and other educational resources, matching community energy project needs with available financial or technical support, and helping provide access to job training and recruitment opportunities for local business partners, among other local activities. By utilizing this program and other creative techniques, Cornell Cooperative Extension of Tompkins County's Retrofit Program Marketing Model has now achieved the highest retrofit rate in the state. It is anticipated that continued success will be achieved through NYSERDA's new Economic Development Growth Extension (EDGE) Program.

Develop a regional energy roadmap (Action 2)

Estimated GHG Reductions: Not possible to quantify

► Why Take This Action?

A regional energy roadmap will establish a detailed plan to achieve the Southern Tier's desired energy portfolio. It will identify potential future energy scenarios and spur action by presenting short- and long-term steps to achieve the desired scenario. The regional energy roadmap will require a proactive strategic planning process to maximize renewable energy resource development, energy efficient technology and measures deployment, and reduce dependence on imported fossil fuels. By identifying clear action steps in a comprehensive energy roadmap, the Southern Tier can target investment and policy decisions, and form strategic partnerships to leverage existing initiatives and opportunities. It would provide foundational knowledge about renewables in the Region as well as gaps in developing the potential of these energy sources. The roadmap would provide a transparent plan for all community members to see the value of the investment in clean energy and energy efficiency in light of the projected results. It would increase understanding and awareness about the financial and operational aspects of specific renewable energy and energy efficiency technologies.



Clean energy businesses are likely to be attracted to a region that has a clear vision of the energy portfolio it wants to achieve, a strategy for getting there, and an educated, supportive community. Jobs may be created by increasing demand for retrofit and clean energy project deployments as part of rolling out the plan. Demonstration of a long term commitment to clean energy development provides stability for business owners to invest in local economic development to support those initiatives.

► What Can Be Done?

Developing a roadmap will require looking at a number of factors including energy resource availability, financial resource availability, market conditions, community buy-in, and pathways for technology deployment through existing or future networks. The roadmap will include analysis of: 1) the energy generation potential of renewable energy, including solar, wind, biomass, geothermal, and hydropower, 2) the energy saving potential of advanced energy efficient and renewable technologies, such as CHP and district heating, and 3) the energy savings associated with improving energy efficiency in buildings. This analysis will also allow the Region to prioritize investment and develop a realistic timeline.

► What are the Barriers to Taking This Action and How Will They be Overcome?

The principal barrier to taking this action in the Southern Tier is a lack of resources to both fund the expert analysis required to prepare an energy roadmap and oversee the preparation of such a strategy. Since there is currently no Southern Tier regional organization with staff, budget, and the ability to implement a regionwide

study such as this, it will be a challenge to find an entity to take on such a task at the regional level. This action will require substantial staff or expert volunteer time to participate in an ad hoc working group as well as someone to lead the effort. It will also require funding to hire technical experts to complete analysis and develop the roadmap with significant input from the community and elected officials. The Region intends to overcome these barriers by using the partnerships formed as a result of this Cleaner Greener Southern Tier planning program to a) utilize findings and models from similar work being done in the Region, like the Tompkins County Energy Roadmap, b) identify funding and staffing resources from regional universities, businesses, and organizations that see the value in strategic energy planning, and c) seek state or federal grants to assist regional planning initiatives.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

While no immediate reductions in GHG emissions will be achieved by completing this project, a more detailed understanding of the energy demand and renewable supply and energy efficiency potential in the Region will help determine the most effective and efficient means of meeting the Southern Tier's long-term energy goals. The roadmap will help define and accelerate key demonstration projects and help build demand and customer interest, leading to accelerated deployment for renewable and energy efficiency projects. This action supports the GHG reduction benefits described under Action 1.

▶ **Recommended Next Steps**

- Hire an energy expert to quantify specific energy generation potential of renewable energy including solar, wind, biomass, geothermal, and hydropower based on resource availability, and analyze the cost of each option. The preliminary analysis done as part of this Plan could serve as a starting point for this study, with additional resources provided from potential partners such as NYSERDA, the U.S. Department of Energy (DOE), and Cornell University.
- Conduct a wind study to determine micro wind climates that will support mid-scale wind; this will allow for accurate scoping of the potential deployment and energy generation. The analysis could lead to development of wind maps which will include distinct wind power classes, electricity infrastructure, utility boundaries, and certain physical or population constraints. Site-specific feasibility studies will be required to determine exact placement of wind turbines.
- Analyze and estimate the energy saving potential of advanced energy and efficiency technologies including CHP, district heating applications, and energy efficiency measures in residential and commercial buildings. The energy savings should be based on current energy consumption data, and the scope and feasibility of deploying the energy efficiency retrofits.
- Building on the first three steps, develop future energy scenarios. These scenarios will be discussed with the community to make clear the benefits and potential impacts of each energy scenario. The scenarios will be evaluated with regards to required funding, community resources, and consequences of inaction.
- Once one or several preferred scenarios have been chosen, develop an action plan with concrete steps to achieve the desired outcome.

▶ **Who are Potential Leads and Key Partners for This Action?**

This project could be led by the regional planning boards or Cornell Cooperative Extension, in partnership with local governments and universities and the REDC. Resources for this analysis may be available through NYSERDA, DOE, universities and colleges within the Region, with potential contributions from businesses and local governments. Energy consumption data and calculations for estimating the impact of energy upgrades may be available from utility companies or NYSERDA.

▶ **How Would Funding be Used?**

Costs may include funding for direct expenses such as; educational and outreach materials development, modeling, website development, wind measurement studies, strategy facilitation, and professionals with expertise in renewable energy and energy efficiency. Indirect expenses may include costs for paid staff, both

from the community and from other organizations. Monetary savings associated with this plan will result from strategic and well supported investments in technologies and initiatives that have been chosen based on their economic, social, and environmental value to the Region.

▶ **Examples and Potential Projects**

The Tompkins County Energy Roadmap was initiated in 2011 by the Tompkins County Planning Department working with four Cornell graduate students from the fields of management, engineering, and planning. They have initially analyzed wind, solar, and biomass resource potential in the county. Subsequent steps will include developing future energy scenarios presenting varying levels of a renewable energy mix, evaluating those scenarios, assisting the community in identifying a preferred scenario, and developing an action plan to achieve that preferred scenario.

Explore and create financing options for renewable energy and energy efficiency systems (Action 3)

Estimated GHG Reductions: Not possible to quantify

▶ **Why Take This Action?**

One critical action that received widespread support and interest during the Cleaner Greener Southern Tier Plan public involvement process was the need to supplement and support the programs provided by New York State and various Federal agencies to retrofit and upgrade the Region's building stock. This action acknowledges that, while current NYS programs are national models of how to finance energy efficiency and renewable energy systems, the need in the Region far outstrips the existing levels of funding for these programs. In addition, State and Federal programs may or may not be funded from year to year, and often include requirements and paperwork that limit the number and type of people who can participate in the programs. This action hopes to provide more flexibility to financing energy improvements, as well as the ability to fill gaps identified in State and Federal programs. One example of such a gap is that weatherization programs will not install insulation unless roofs are in good repair, but do not pay for roof replacements. This action could provide financing targeted to fill those gaps. For example, financing could be provided to repair roofs that would allow homeowners to be able to take advantage of State and Federal programs for which they are otherwise qualified. Stakeholder groups, as well as public meeting and website input, identified the need to empower local government, agencies, and financial institutions to develop long-term, stable financing options to assist businesses and homeowners.

Initial investment and long payback periods are often disincentives to retrofitting buildings and installing renewable systems. Innovative financing options can help overcome this lack of up-front capital.

Increasing access to capital will allow home and business owners to invest in energy efficiency measures in buildings and operations and to replace a portion of energy generated by fossil fuels with renewable energy technology. Making these investments offers some of the largest greenhouse gas reductions available in the Southern Tier. The establishment of financing mechanisms, such as a green revolving loan fund or loan loss reserve to leverage private capital, will ensure that funding for retrofits and renewable energy systems is available in the future.

Due to the high potential for overlap with other measures, the GHG reduction benefits for financing were not quantified separately. This action will help achieve other energy efficiency and renewable energy goals and support other actions in this Plan. Jobs may be created by increasing demand for retrofit and clean energy project deployments. See Action 1, "Promote Energy Efficiency and Renewable Energy in Residential and Commercial Buildings" which discusses jobs associated with increasing efficiency and renewable energy in buildings.

▶ **What Can Be Done?**

To be effective, these financing products should offer more favorable terms than currently available through private financing. To improve private lending terms with limited public funding, governments can offer credit enhancement options to lenders, such as a loan loss reserve or an interest rate buy down. Another approach is to create a revolving loan fund with both public and private capital. The public funding can take a subordinate repayment position, allowing better lending terms but also a potential return on capital for both public and private investors. A region- or county-wide loan pool will leverage private capital and stimulate local economic activity. Typically, private investors prefer a 10 percent loan loss reserve fund. In this case, \$1 million could leverage \$10 million in private capital to lend for energy efficiency measures and renewable energy systems. A local example of this mechanism is New York State's Capital Access Program, sponsored by Empire State Development, which provides loan loss reserves.

▶ **What are the Barriers to Taking This Action and How Will They be Overcome?**

The main barrier to implementing this action in the Southern Tier is the lack of experience with some of the creative financing methods that are being tried successfully in other parts of the country. Methods that could be used to overcome that barrier include bringing in speakers from municipalities, banks, venture capital managers, and others who have successfully implemented various financing programs, applying for grants to hire experts to help build financing programs or to capitalize a loan program, and setting up roundtable discussions for interest groups in the Region to share ideas and collaborate on solutions.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

While no immediate reductions in GHG emissions will be achieved by this action alone, the financing and education programs will support the GHG reduction benefits under Action 1 as well as several other renewable energy actions. Increasing access to low-cost capital to encourage homeowners and businesses to invest in increasing efficiency of buildings and offsetting some non-renewable energy use with renewables will lead to reduced GHG emissions. If the financing mechanisms are implemented strategically through revolving loan mechanisms, the funding should be available for the long term.

▶ **Recommended Next Steps**

- Establish an ad hoc working group to review financing and program options and begin working with financial institutions.
- To understand what is currently available, the ad hoc working group should analyze how NYSERDA's existing financing programs – Green Jobs Green NY and On-Bill Recovery Financing Programs – are being utilized in the Southern Tier and develop strategies to overcome barriers and enhance access for area residents to tap these financing mechanisms. Consider bringing in speakers from successful programs to educate and inspire stakeholders in the Region, as well as convening interest groups for discussion of the topic and brainstorming solutions.
- Identify a pool of funding for capitalizing a loan program. The Southern Tier Regional Economic Development Council's Regional Strategic Plan established a \$1 million revolving loan fund. Bond financing may be feasible for major renovations, such as school construction and municipal buildings. Other sources of capital could be state or county financing authorities.
- The Southern Tier Regional Economic Development Council could consider a loan loss reserve fund to leverage private capital and expand the impact of the loan fund. If Federal and State legal barriers can be overcome, they could also explore options for establishing either a region-wide or county-by-county commercial PACE (property-assessed clean energy) program. If the region-wide approach is selected, an opt-in approach at the municipal level could be incorporated. Resources for implementing commercial PACE include: Energize New York Benefit Finance Program Handbook (energizeny.org/eic) and PACENow (www.pacenow.org).

▶ Who are Potential Leads and Key Partners for This Action?

Potential leads will depend on the specific program elements and whether a regional or county-by-county approach is pursued. Lead agencies include regional planning boards, municipalities, community banks, Southern Tier Regional Economic Development Council, county financing authorities, and Community Development Financing Institutions (CDFIs). Key partners include energy-related businesses and contractors and private foundations. It will also be essential to work closely with NYSERDA to ensure that local programs are compatible with and do not duplicate state programs.

▶ How Would Funding be Used?

Funding could be used to bring in speakers who have successfully implemented financing programs, in hiring experts to help develop programs, and for seed capital for financing initiatives. In its *2020 Energy Strategy*, Tompkins County estimated that launching a county-wide PACE program would require capital in the amount of \$1 to \$2 million. It may be reasonable to assume that a regional fund will need approximately \$10 million, but detailed studies will be needed to fine-tune the program. Other expenses may include staff costs and marketing and outreach materials.

▶ Examples and Potential Projects

- The Alternatives Federal Credit Union, located in Tompkins County, has begun offering special discounts on loans for green home renovations, as well as solar panel installations and hybrid vehicle purchases. This socially- and environmentally-conscious lending incentivizes purchases which are supported by the local community, and support the Region's sustainability goals.
- Other financing examples include the Finger Lakes Climate Fund, Binghamton's Green Jobs Revolving Loan Fund, and financing through NY State's Green Jobs Green NY and On-Bill Financing programs.

Facilitate deployment of solar photovoltaic and solar thermal systems (Action 5)

Estimated GHG Reductions: 31,000 MTCO₂e Annually by 2032

▶ Why Take This Action?

This action focuses on the regional deployment of solar electric photovoltaic (PV) which produces electricity, and solar thermal, which produces heat or hot water, for household, commercial, institutional, and industrial uses using energy from the sun.

In 2011, the Region had well over 500 solar installations in place, mostly solar PV. Opportunities for deploying this technology using State tax incentives and subsidy programs are expected to continue; New York State has emphasized solar PV as a critical renewable resource under its Renewable Portfolio Standard (RPS), which sets a goal to increase renewable electricity sources to 30 percent by 2015. Solar energy can lower the costs of heating and electricity in homes and businesses, reduce the use of fossil fuels which may rise in cost, and lower GHG emissions. There is potential for increasing local jobs in solar installation businesses, potentially 55 jobs annually could be created, averaged over the lifetime of the project, if deployed aggressively region-wide to expand capacity from current 4 MW to 110 MW, supplying 2 percent of regional electricity use at today's consumption rate, within twenty years. This equates to doubling solar capacity approximately every four and a half years.



▶ What Can Be Done?

Individuals, organizations and institutions may purchase solar systems for homes or businesses. Alternatively, solar leasing or power purchase agreements (PPA) are becoming a common mechanism for residential and non-residential customers with high energy use in urban areas. Generally, both PPAs and leasing contracts allow the customer to pay no more than they currently pay for electricity with little or no up-front cost. Another method of deployment of solar PV and solar thermal systems at a competitive price is by aggregating purchases of smaller solar systems.

▶ What are the Barriers to Taking This Action and How Will They be Overcome?

- Much of the Southern Tier does not have the critical population mass to readily attract private financing and the initial cost of solar installation is high compared to other energy technologies, even with current State and Federal incentives, unless purchased at a substantial discount via bulk purchasing or other means. Therefore, one promising method to overcome this barrier in the Southern Tier is by implementing “Solarize” campaigns, such as those found in Oregon, Connecticut, Massachusetts, and, recently, Madison County in NYS. These programs focus on the collective purchase of solar systems through community education, highlighting current homeowners and businesses as “champions”, and achieving cost savings of 25 to 35 percent. Aggregation programs also address a number of market barriers: a contractor is able to provide the same number of systems for a reduced price because of reduced marketing and lead generation costs. Federal and state tax credits and state incentives are applied to their fullest extent, the complexity of reviewing technical specifications and multiple contractors is aggregated in a group effort, and low price and reduced effort helps customers to act more quickly, overcoming customer inertia.
- Additionally, there is a general lack of community awareness of the value of solar systems in the Region, and outreach about purchasing options, system economics, technology applications, and actual site requirements will be critical. While residential solar installations are generally allowed under zoning codes, they may face obstacles in some homeowner association covenants, and large commercial installations may face permitting issues. Additional education and outreach and updating zoning codes and homeowners association covenants would address these barriers.

▶ How Will This Help the Region Achieve its Sustainability Targets?

Increasing regional capacity from the current 4 MW to 110 MW-DC within twenty years will represent about two percent of baseline energy consumption in the Region. This is a 27-fold increase over today’s capacity, equivalent to doubling capacity every 4.8 years, or adding 5.5 MW-DC of capacity each year, on average. This is equivalent to about 14,600 installations of today’s average size project over twenty years. The resulting capacity will result in avoided annual GHG emissions of approximately 31,000 MTCO_{2e}, or one percent of the Plan’s estimated GHG reduction benefits.

▶ Recommended Next Steps

- Form an ad hoc solar initiative working group to review existing programs and case studies on facilitating solar deployment. A more detailed study of the potential for solar in the Region accounting, for instance, for building suitability, shading, and open solar developable land, is recommended to refine the long term solar goal and shape near and long term strategy.
- Engage NYSERDA for program assistance and include other state agencies that have implemented successful solar programs. Assistance might include reviewing technical specifications and cost saving potential, providing program planning support, and helping program designers leverage NYSERDA solar rebates. The Southern Tier should also connect with leaders of successful “Solarize” campaigns to obtain sample RFPs and lessons learned.
- The ad hoc solar initiative working group formed as part of this action could solicit support from neighborhood, town, county, and regional coalitions, like the regional planning and development boards, for assistance in gathering community support, increasing awareness, and coordinating the initiative. There is also an opportunity to engage school districts.

- Next, the community can engage solar developers through RFPs for bulk purchase and deployment when a specific number of consumers commit to purchase by a certain date.

▶ **Who are Potential Leads and Key Partners for This Action?**

Potential leads include regional planning and development boards, municipalities, non-profits, and Cornell Cooperative Extension. Other partners may include NYSERDA, non-profits, local governments, universities, and schools.

▶ **How Would Funding be Used?**

While Solarize campaigns can be successful with all-volunteer organizers, widespread programs will require funding to hire staff to develop marketing programs, conduct public outreach, and coordinate purchases with solar contractors.

▶ **Examples and Potential Projects**

Solarize Madison in Madison County, NY promotes sustainable energy production to stabilize current and future energy costs. The Madison County Planning Department and the Central New York Regional Planning and Development Board are leading the program with support from the Renewable Energy Training Center at Morrisville State College. This program has assisted in the deployment of at least 30 solar PV installations in Madison County. It attracted participation from County residents, farmers, business owners, municipalities and institutions. In addition to state, Federal, and utility incentives, Madison County Planning Department offered limited \$2,000 grants to homeowners to help offset the costs associated with installing a direct-own solar PV system.

Facilitate use of biomass for heating (Action 10)

Estimated GHG Reductions: 398,000 MTCO_{2e} Annually by 2032

▶ **Why Take This Action?**

Many homes and businesses in the Southern Tier rely on high-cost and high-emissions sources of heat, such as fuel oil, propane, and coal. This varies greatly between urban and rural areas in the Region. For example, in rural Delaware County, 60 percent of homes are heated with these fuels, and only 12 percent with natural gas; in more urban Broome County, 20 percent of homes rely on these high-emissions fuels and 65 percent on natural gas. By switching to local biomass – wood and, potentially, fast-growing renewable crops – residents and businesses could obtain heat at reduced prices, create jobs, and increase income in rural areas. Using locally-sourced biomass for heating fuel builds the rural, agricultural economy and keeps money in the Southern Tier rather than sending it out of the Region to purchase fuels sourced elsewhere. Another benefit of utilizing biomass is that it has tremendous potential to reduce GHG emissions when used in lieu of conventional fossil fuels, as long as the biomass is sourced responsibly.



Packaged wood pellets (New England Wood Pellet LLC).

If the Southern Tier were to achieve a goal of having 20 percent of households use biomass for heating, 40 percent of houses that currently use heating fuels (oil/propane/coal) would need to transition to biomass, decreasing regional GHG emissions by 4 percent.

▶ **What Can Be Done?**

In many industrialized countries, biomass is commonly used as a source of thermal energy for residential and institutional heating and for some industrial applications. Based on the extensive forest resources in the Southern Tier, woody biomass is a renewable resource that could be successfully utilized for its energy generation potential and application to heating homes and businesses.

The Region could identify key demonstration projects that can build the market for this fuel source, focusing on institutions and public buildings. Schools and government facilities are appropriately sized for catalyzing biomass market demand and complementing the proposed increased use of Combined Heat and Power, also called co-generation, of electricity and thermal energy. The Southern Tier can build on already-existing wood pellet manufacturing facilities that have capacity to expand, such as New England Wood Pellet LLC. Southern Tier leadership may also work with biomass growing organizations that are seeking to coordinate growing and harvesting renewable biomass crops through developing a regional biomass consortium.

▶ **What are the Barriers to Taking This Action and How Will They be Overcome?**

- Barriers to developing biomass as a primary energy source in the Southern Tier include a current lack of infrastructure to coordinate forest and crop landowners to grow, harvest, and produce raw biomass resources to be used as a heating fuel; and a lack of awareness and acceptance of biomass-fueled heating systems as a viable alternative to current heating systems.
- A critical element to the industry's success is to build the market demand for biomass; the resource is ready for development but an increased number of consumers are necessary to achieve maximum marketability. This can be accomplished by outreach and marketing to residential consumers, as well as targeted education and technical assistance to school, institutional and government facilities managers.
- There are potential environmental issues related to the use of biomass for heating – systems that are deployed should be high-efficiency and low-emission to reduce impacts on air quality.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

Currently, about 62 percent of the region's households use natural gas or electricity for space heating; 31 percent use fuel oil, propane, and coal; and 7 percent use wood. With a regional biomass initiative to encourage the use of locally-sourced biofuels, reaching total market share of 20 percent would require about 33,000 homes in the Southern Tier to switch from oil, propane, or coal to biomass. Combined with similar fuel switching in the commercial and industrial sectors, regional emissions would be reduced by an estimated 398,000 MTCO₂e, or 12.5 percent of the Plan's estimated GHG reduction benefits.

Increasing the use of local biomass resources will also address the economic development goal of increasing farm sales, although the specific amount cannot be quantified for this action.

▶ **Recommended Next Steps**

- Identify key biomass demonstration projects that have the potential for building biomass industries in the Region. These could include institutions, public schools, and government buildings that are not served by natural gas.
- Continue education efforts to inform landowners and farmers about the potential for biomass in order to participate in a biomass market. This may include facilitating the creation of landowner consortiums for growing and harvesting biomass resources.
- Continue to explore financing mechanisms to promote and expand use of biomass for heating.

▶ **Who are Potential Leads and Key Partners for This Action?**

Potential leads for this action include Cornell Cooperative Extension and regional planning boards, in conjunction with local governments. Key partners will be NYSEDA, wood pellet manufacturers, heating and equipment dealers, major institutions (such as hospitals and schools), farmers, and rural landowners.

▶ How Would Funding be Used?

Funding will be needed for staff to educate consumers to build demand, while also coordinating landowners, possibly into biomass cooperatives. Funds will also be needed to hire experts to determine the feasibility of commercial and institutional installations, although much of this can be accomplished by private contractors via performance-based contracting. There will be significant costs associated with replacing fuel oil, propane, and coal-fueled systems with biomass-fueled systems, however, as many of these systems are aging and need replacement in the near future, these could be phased in and the capital costs recovered through energy savings over time. Once the program shifts to individual homeowners and businesses, financial support may be needed to support transition costs, particularly for low- and moderate-income households.

▶ Examples and Potential Projects

- New England Wood Pellet LLC in Delaware County is the largest biomass wood pellet manufacturing facility in the Northeastern U.S. The company produces enough energy pellets annually to heat 25,000 homes and businesses. They have opened a second plant in Schuylar County. The company primarily serves the residential market but hopes to expand their commercial market sales.
- Lockheed Martin has a 100 percent biomass CHP plant which can act as a demonstration project for industrial biomass use in the Region.
- Substantial potential exists to increase the use of biomass in CHP applications in schools, institutions, and government buildings. Presently, Vernon-Verona-Sherrill Central School District is converting its oil-fired maple syrup production facility to burning willow and other biomass grown on its own fields. The project is meant to demonstrate a small-scale, closed-loop renewable biomass system based on an emerging technology, while providing students with management and oversight skills that would be useful in a variety of related careers in the emerging field of biomass utilization.

Facilitate use of combined heat and power in private development projects and public facilities (*Action 11*)

Estimated GHG Reductions: 37,000 MTCO₂e Annually by 2032

▶ Why Take This Action?

Combined heat and power (CHP), also known as co-generation, is an innovative technology which increases energy efficiency at facilities which generate energy on site. In these facilities, the “waste” heat from the combustion process to produce electricity is captured and utilized. In this way, electricity and thermal energy are produced from a single fuel source, resulting in significant efficiency improvements, energy savings, and emissions reductions. According to the U.S. Environmental Protection Agency (EPA), a 5 MW natural gas-fired CHP system produces just half the GHG emissions of a separate heat and power system.³ While CHP systems are often fueled by natural gas, they can also be installed as biomass systems.

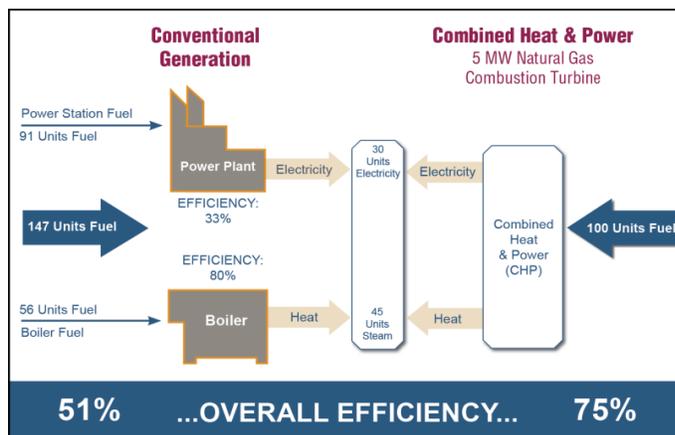
Combined heat and power is an economical way to reduce the primary energy consumption and GHG impact of existing industrial, commercial, agricultural, and government facilities, while also reducing the impacts from energy demands associated with new development in the Region. According to the DOE, “packaged CHP systems” integrated into commercial buildings can offer up to a 40 percent improvement in building efficiency over conventional heating systems.⁴ In addition to the GHG emissions benefits and cost savings, CHP systems can increase power reliability, enhance power quality, and increase operational efficiency.

³ U.S. Environmental Protection Agency. Combined Heat and Power Partnership. (August 2012) “Fuel and Carbon Dioxide Emissions Savings Calculation Methodology for Combined Heat and Power Systems” http://www.epa.gov/chp/documents/fuel_and_co2_savings.pdf

⁴ S. Clean Heat and Power Association (USCHPA). “CHP Technological Advances” <http://www.uschpa.org/i4a/pages/index.cfm?pageid=3292>. Accessed March 25, 2013.

A technical analysis of CHP in the Southern Tier was conducted as part of the Plan and revealed that there is a potential capacity of 324 MW of new CHP in the Region at over 700 sites, including industrial, commercial, government, and institutional facilities.⁵ There are 123 government facilities alone, including water treatment facilities, schools, government buildings, and prisons, which have the potential to produce 21.8 MW of energy. Two examples of private development and redevelopment efforts that are considering incorporating CHP technology are the revitalization of the downtown Ithaca Commons and redevelopment of the Emerson Power Transmission site. It is anticipated that if this initiative is fully implemented, 79 jobs annually could be created, averaged over the lifetime of the project.

FIGURE 3 ■ Comparison of CHP Efficiency to Separate Production of Heat and Power



▶ What Can Be Done?

Feasibility studies can be commissioned by local governments looking to incorporate CHP into their facilities, by economic development agencies looking to assist businesses in developing lower-cost energy systems, or on a case-by-case basis by private institutions and businesses upgrading their energy systems. These types of improvements can be addressed through a performance contract with an energy contractor so that money saved as a result of energy improvements is used to offset the cost of financing and installing the improvements. Performance contractors only finance packages of projects where the future savings are projected to be greater than the up-front costs. Developments in CHP, including micro-CHP, may make uses of this technology more feasible and cost-effective in smaller commercial applications in the future.

▶ What are the Barriers to Taking This Action and How Will They be Overcome?

- There is not widespread understanding or knowledge of the CHP technology in the Southern Tier.
- Additionally, the systems can be expensive to purchase and install and require significant up-front expenditures.
- Balancing peak winter heating needs with peak summer electricity demand can make it difficult to maximize efficiency.
- These barriers can be addressed by developing and implementing a marketing campaign targeted to private and public facilities and management staff and board members of school districts, institutions, local governments, and other entities responsible for aging physical plants. Grants or low-interest loans to help cover higher initial costs or feasibility studies could help overcome the cost barrier.

▶ How Will This Help the Region Achieve its Sustainability Targets?

There is a potential capacity of 324 MW of new CHP in the region at over 700 sites, including industrial, commercial, government, and institutional facilities. Assuming that 50 percent of this potential is realized over the next 20 years, that those systems run 50 percent of the time, and that the observed reduction falls in the mid-point of the range at 23 percent, these new installations can reduce regional emissions by 37,000 MTCO₂e, or 1.2 percent of the Plan's estimated GHG reduction benefits.

⁵ ICF International. Technical analysis for Cleaner Greener Southern Tier Baseline Assessment. August 2012

▶ Recommended Next Steps

- Establish an ad hoc working group of interested municipalities to educate themselves on CHP and evaluate the economic feasibility of adding CHP to some of the 123 government buildings identified as suitable for CHP that are under the direct control of government decision makers.
- Once government facilities staff and decision makers have a better understanding of the issues involved, the working group could approach economic development agencies to identify specific projects, landowners and developers that may benefit from CHP, and then host a workshop on the topic for both the public and private sector development professionals.
- After specific project opportunities are identified, efforts should be made to assist with and advocate for securing funding, technical support, services, information, and incentives for CHP initiatives from organizations such as the EPA Combined Heat and Power Partnership Program, DOE Northeast Clean Energy Applications Center, NYSERDA, the Southern Tier Regional Economic Development Council, and other federal, state, and regional sources.

▶ Who are Potential Leads and Key Partners for This Action?

Organizations well-suited to undertake this action are the regional planning boards, colleges and universities, hospitals, industry, and other entities with high power usage. Key partners are government officials, energy professionals and businesses. Technical support can be sought from the EPA Combined Heat and Power Partnership Program, DOE Northeast Clean Energy Applications Center, and NYSERDA.

▶ How Would Funding be Used?

Funding will be needed for staff to conduct outreach and manage projects, as well as money to hire experts to design the systems. Costs to install CHP can be significant, but can be installed via performance contracts and paid for through cost savings over time, although many contracts require an initial payment for project design.

▶ Examples and Potential Projects

- Cornell University's CHP System utilizes two 15 MW gas turbines to produce 70 percent of campus electricity. Two heat recovery steam generators use the waste energy to provide 50 to 90 percent of campus steam needs. This system reliably provides power and heat while reducing annual CO₂ emissions by 64,000 metric tons per year. This CHP system is the largest in the Southern Tier, representing about 75 percent of the Region's existing CHP capacity.
- Two examples of private development and redevelopment efforts that are considering incorporating CHP technology into the projects are the revitalization of the downtown Ithaca Commons and redevelopment of the Emerson Power Transmission site.

TRANSPORTATION

Improve connectivity of pedestrian, bike, and transit routes, especially around downtowns, transit stops, and schools (*Action 12*)

Estimated GHG Reductions: 14,000 MTCO_{2e} Annually by 2032

▶ Why Take This Action?

Residents and community leaders throughout the Southern Tier have a strong interest in revitalizing existing downtowns, villages, and hamlets. Creating a well-connected network of bicycle and pedestrian trails and sidewalks will improve the downtown walking and biking environment. Providing opportunities for people to travel on foot or by bicycle leads to more vibrant business districts with less surface parking, more cohesive communities, and healthier residents. Increased physical activity can save hundreds of millions of dollars in

health care costs⁶ while improving access to community resources for seniors and youth. Given that sidewalk construction accounts for approximately three percent of the overall cost of rehabilitating or constructing new buildings in downtown areas, and constructing bike lanes accounts for five percent of the overall cost of rebuilding or constructing new roads,⁷ relatively small investments in pedestrian and bicycle facilities can yield significant benefits. A connected bicycle and pedestrian network can decrease vehicle trips and reduce GHG emissions. Through its impacts on community revitalization, this strategy, in combination with other revitalization action items, is likely to create additional jobs in the Region.



Example of a re-engineered complete street Urban Advantage, CD+A, and H.B. Rue for TJPDC

▶ What Can Be Done?

There are several effective ways to improve the walking and biking transportation system, including constructing safe and accessible bike and pedestrian paths and sidewalks, making critical connections at key locations, such as schools, transit stops, and community services, and improving the safety and functionality of biking and walking in downtowns. Since walking and wheeling are the primary means of access to transit, completing and connecting the walking and wheeling network can also increase access to transit and support enhanced transit service.

▶ What are the Barriers to Taking This Action and How Will They be Overcome?

- Although the costs of constructing bicycle and pedestrian facilities are low as a percentage of total project budgets, they are still significant investments, and sufficient regular funding to retrofit existing facilities is not available in the Southern Tier.
- Public works and planning staff may not know the specifics of why walkers and bikers do not take certain routes; a common reason for avoiding paths can be gaps in a section of the path or dangerous intersections that are perceived as threatening to users.
- In parts of the Southern Tier, established land use patterns and infrastructure are oriented toward automobile use, not walking, biking or transit.
- These barriers can be overcome by identifying critical network gaps near well-used facilities, focusing resources on key connections, and requiring new facilities to be complete streets that meet the needs of walkers, bikers and automobile drivers.

▶ How Will This Help the Region Achieve its Sustainability Targets?

Enhancing options for walking and wheeling, combined with an increase in housing units in downtown and priority development areas, will likely result in shifts to more sustainable forms of transportation, reduced vehicle travel, reduced fuel sales, and fewer GHG emissions.

Based on a 1 percent reduction in vehicle miles traveled in the region's cities and villages, this measure will reduce fuel consumption by approximately 1.4 million gallons of gasoline, ethanol, and diesel and regional emissions by 14,000 MTCO₂e, or 0.4 percent of the Plan's estimated GHG reduction benefits. The analysis assumes an 18 percent increase in city and village population consistent with the long range target that 45 percent of the region's population will live in cities and villages.

⁶ Beil, Kurt. "Physical Activity and the Intertwine: A Public Health Method of Reducing Obesity and Healthcare Costs," Jan. 21, 2011. Portland Metro.

⁷ Norm Steinman (Charlotte DOT) in a presentation for communities participating in the CDC's Communities Putting Prevention to Work program.

▶ Recommended Next Steps

- Review existing bike and pedestrian networks to identify gaps in connectivity, particularly near schools, transit stops, and community facilities. In rural areas, highlight connectivity to regional multi-use trails and on-road bicycle facilities leading to downtowns, parks, and schools.
- Inventory the quality of bicycle and pedestrian facilities and interview users to identify gaps and needed improvements to increase safety and access, and encourage additional use.
- Identify and pursue funding sources for projects once specific gaps and improvements are identified. Some programs that work to improve safety and access to transportation for all users include SafeSeniors, Safe Routes to Transit, and Safe Routes to School.
- Adopt complete street design standards, developed in partnership with the MPOs, regional planning and development boards, local governments, and NYSDOT. This requires customizing the street guidelines for the wide range and size of communities across the Region, and aligning them with NY State’s new Complete Streets legislation.

▶ Who are Potential Leads and Key Partners for This Action?

Potential leads include municipal transportation planners and MPOs, regional planning and development boards, or transportation advocacy groups. Key partners include NYSDOT, local land use planners, public works staff, school districts, transit operators, downtown business organizations, developers, and walkers and bikers in a community.

▶ How Would Funding be Used?

Identifying and inventorying the existing bicycle and pedestrian networks, planning and designing improvements, and overseeing construction requires significant staff or consultant time, which is a barrier given that local staff juggle many competing priorities. Adopting a plan for future improvements, along with complete streets design guidelines, can help overcome that barrier and ensure that private development helps to connect and improve existing infrastructure. Costs to construct or rehabilitate paths, sidewalks and street crossings will range in price from small investments for maintenance and operations or improving signage, to larger investments to construct new facilities and retrofit major intersections.

▶ Examples and Potential Projects

- The City of Binghamton has made significant progress on completing on-road and off-road bicycle and pedestrian facilities. The Route 434 Greenway is currently in design to connect downtown Binghamton with Binghamton University and surrounding neighborhoods, schools, parks, and commercial districts.
- Over the past several years, the City of Ithaca has painted new bike lanes on city streets, built new multi-use trails, and installed over 100 bike racks throughout the City. The City is currently conducting a feasibility study on creating a network of “Bicycle Boulevards,” which are low-traffic routes where bicycles are prioritized above motor vehicles.
- NYSDOT has also made significant progress in improving safety and access on rural highways as they pass through existing residential and business areas, such as the new roundabout installed on Route 13 in the Town of Horseheads.

Pilot opportunities for intercity bus service, expanded cross-regional transit, and rural on-demand transit (*Action 13*)

Estimated GHG Reductions: 81,000 MTCO₂e Annually by 2032

▶ Why Take This Action?

The existing transportation system in the Southern Tier was not designed to solve 21st century problems such as GHG emissions, high fuel costs, an aging population, and high maintenance costs. Commute patterns are

the single most important factor in fuel consumption and private vehicle travel accounts for most trips taken in the Region. Many of these trips are single-occupancy vehicle trips, so making public transportation a real and feasible option for people is important.

While the Region has transit that serves the six cities and immediate environs of Binghamton, Corning-Elmira, and Ithaca, bus services between these cities could be improved. There is an opportunity to explore and pilot programs to fill these transit gaps for inter-city, cross-regional, and rural trips. In addition to reducing GHG emissions, this action has potential cost savings benefits by reducing costs through consolidation of services, such as senior and medical transit services. Direct cost savings to the Region's residents will result from this action, as households that use public transit can save as much as \$6,251 or more every year.⁸ Jobs in the Southern Tier transportation industry will likely increase, both in manufacturing and in providing transportation services, if this action is implemented.



▶ What Can Be Done?

The Region's three MPOs, in coordination with the New York State Department of Transportation (NYSDOT), have been studying regional traffic flows, travel patterns, and gaps in service to determine transportation demand and needs within the central portion of the Region. Consolidating medical, elderly, and paratransit services is a primary need in this Region, which has an aging population that is highly dispersed. Replicating successful programs such as Gadabout in Tompkins County that provides on-demand shuttle service for seniors could begin to meet this demand.

Three other pilot programs that have been identified through transportation demand analysis are: the establishment of express commuter bus service between the Region's cities; expansion of on-demand rural transit service particularly in Delaware, Chenango, and Schuyler Counties; and expansion of privately-operated choice ridership service for intercity trips, such as Binghamton to New York City. Integrating information technology into transit service will be vital to enhancing customer information, scheduling and connections, and payments. There is a strong interest from the MPOs in continued cross-agency collaboration to support these pilot projects and create a seamless interface for transit riders across the Southern Tier, creating a positive transportation experience. As personal choice and convenience encourages and maintains increases in transit ridership, this last item is critical.

▶ What are the Barriers to Taking This Action and How Will They be Overcome?

- There are numerous barriers to expanding and enhancing transit service across the Southern Tier. The geographic breadth and low density of development makes transit operations expensive.
- On-demand service fills gaps but is very expensive on a per trip basis.
- Significant funding cuts to MPOs to provide transportation planning and programs are taking place, making it more difficult to develop new routes and services while maintaining the existing level of service.
- Public transit systems are also facing constrained State and Federal support.
- One of the largest barriers to expanded and new transit service is public perception; as the majority of the population lives in rural areas where there is no service, many Southern Tier residents have little experience with transit and may not be comfortable using it.
- These barriers can be overcome by incorporating public outreach into system planning, and by marketing transit service aggressively with other transportation services (see Action 14, Expand Way2Go).

⁸ American Public Transportation Association, "The Benefits of Public Transportation," http://www.apta.com/resources/reportsandpublications/Documents/greenhouse_brochure.pdf

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

This action will encourage transit use, helping to increase the percentage of workers commuting via transit from a current rate of 2.4 percent. It will also encourage more residential and business activity in existing downtowns and villages served by enhanced transit. Additional transit service between cities will also help increase the portion of the population in cities and villages from 38 percent (as of 2010) to 45 percent in 20 years. Based on a 5.9 percent reduction in vehicle miles traveled in the region's cities and villages, where higher population densities are more likely to utilize expanded transit, this action will reduce fuel consumption by approximately 9.8 million gallons of gasoline, ethanol, and diesel, combined, based on the average fuel economy in 2010. It will reduce regional emissions by 81,000 MTCO₂e, or 2.6 percent of the Plan's estimated GHG reduction benefits. It also assumes an 18 percent increase in city and village population consistent with the long range target.

▶ **Recommended Next Steps**

- Complete regional study of traffic flows and travel patterns to understand transit potential and implement pilot projects. Currently, five of the Region's eight counties are being studied as part of an integrated planning process. Specific actions from this plan can be implemented across the Region.
- Based on findings from the integrated transportation plan, MPOs and transit service providers should identify potential for service integration for medical, senior, and paratransit services, incorporating needs of other social service and non-profit partners.
- Evaluate innovative approaches taken by several of the colleges and universities in the Region that provide transportation service or subsidize transit passes, as there may be models that could be adopted for serving other student populations and the general public.
- Large employers and municipal governments can build partnerships to increase transit service. Major employers outside of downtown areas could help to finance and market increased transit service along routes stopping at their locations. This should be done in coordination with providing free or reduced-priced transit passes to employees to encourage alternative commuting habits.

▶ **Who are Potential Leads and Key Partners for This Action?**

The primary leads are the three MPOs, public transit providers, universities and major employers, and private regional transportation services. Other key partners are agencies working to coordinate services for seniors and recipients of medical care, as well as business groups, and environmental groups.

▶ **How Would Funding be Used?**

Some of the service expansion planning and coordinating can be done with existing staff, but funding will be needed for consultants or added staff for service analysis and planning. Most transit projects have high up-front costs, including capital costs for expanding bus fleets and technology, and ongoing operating costs for staff, fuel, and maintenance. Some of these costs can be offset by anticipated increases in ridership. In addition, costs for not taking action are high, including such impacts as highway deaths, poor air quality, and costs of maintaining and fueling personal vehicles.

▶ **Examples and Potential Projects**

- Ithaca College allows students to purchase Tompkins Consolidated Area Transit passes for a discounted price. By using the passes, Ithaca College students have access to each bus on the route, allowing them to freely explore the County without a car.
- Cornell University also provides a popular charter bus to New York City that serves all members of the community. This service could be replicated by the private sector to provide bus trips to major east coast cities, increasing the demand for bus service.

Expand Way2Go and other transportation demand management programs (Action 14)

Estimated GHG Reductions: 22,000 MTCO_{2e} Annually by 2032

▶ Why Take This Action?

Transportation Demand Management (TDM) initiatives encourage employees to use public transit, van and carpools, bicycle, walk, or use other alternatives to driving alone to work. Currently 76 percent of workers in the Southern Tier drive alone to work; 19 percent walk, bike, carpool, or take transit. Local governments in the Southern Tier will work with the Way2Go program, other regional TDM initiatives, and 511NY Statewide TDM information system to enhance commute options, thus providing incentives for Southern Tier residents to decrease their car use, and especially single-occupancy vehicle trips.



Way2Go is a comprehensive information hub that seeks to increase transportation access, choice, equity, and sustainability in Tompkins County. The Way2Go program provides a ride- and information-sharing forum for people wanting to take trips within the county and to destinations beyond the county. By using the website, visitors can learn about and compare different ways to get around. Way2Go also provides transit information by phone or mail, conducts public workshops and events that increase awareness of available transportation options, and shares commuter tips online.

Key benefits this action will provide to Southern Tier residents include decreased transportation costs, increased choice, and more efficient, informed travel. It can reduce fuel and maintenance expenses for drivers. A similar “Way to Go” program in Seattle found that forgoing purchase or ownership of a household automobile can result in savings of up to \$4,000 per year.⁹ Employers may also offer tax-free transportation benefits such as transit passes and vanpool services as an employee incentive. Federal tax law allows employers to save on corporate payroll taxes by deducting the full cost of these benefits as a business expense, allowing employees to receive up to \$115 per month in transportation benefits. Along with other transportation actions, it can help reduce regional vehicle gasoline consumption by almost 40 percent in the next 20 years, resulting in significant GHG reductions.

▶ What Can Be Done?

Way2Go programs can be replicated across the other counties of the Southern Tier. Coordinating the Way2Go program with employer-focused TDM outreach and education and the 511NY statewide TDM information system will strengthen the program immensely. Presenting a palette of options to Southern Tier residents for their transportation needs can encourage more households to take advantage of alternative means of travel for some trips, and many households may find they can live with one less car and still retain the mobility and convenience they are accustomed to.

▶ What are the Barriers to Taking This Action and How Will They be Overcome?

- Communicating effectively about TDM programs and transportation choices with different audiences across a large rural region such as the Southern Tier is a key challenge.
- Getting accurate information to people in ways that are convenient, understandable, and lead to action on transportation choices is another barrier.

⁹ See, for example, Seattle.gov, “Way to Go, Seattle!” <http://www.seattle.gov/waytogo/carcostworksheetolcc.htm>.

- Allocating operational funding for expanding TDM program management and marketing is a challenge. Low congestion levels on area roads are also conducive to choosing single occupancy vehicle trips.
- These barriers can be overcome by educating policymakers about the benefits of expanded, better-coordinated marketing and reduced single occupancy vehicle use. The programs can also take advantage of NYSDOT's role in providing trip data through 511NY for use by technology entrepreneurs to develop software applications for improved coordination of travel demand and system operations.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

Expanding TDM marketing will help increase walking, biking, transit, and carpooling. These alternatives to single-occupancy-vehicle commuting can increase from a current rate of 19 percent to 28 percent in 20 years. This action will also help decrease gasoline sales and associated emissions and increase the proportion of Southern Tier residents living in existing cities and villages. Based on a 3.1 percent reduction in vehicle miles traveled associated with commuting, this action will reduce regional emissions by 22,000 MTCO₂e, or 0.7 percent of the Plan's estimated GHG reduction benefits.

▶ **Recommended Next Steps**

- Expand regional TDM effectiveness through the Way2Go program and partnerships with large institutions, such as universities and hospitals, as well as other major employers. Large employers are likely to have the communication infrastructure needed to coordinate shared trips and the critical mass required to make TDM effective.
- Work with coordinators of 511NY to address cultural and information barriers to alternative transportation use. By partnering with 511NY, Way2Go can reduce SOV travel demand.
- Organizers of Way2Go, other TDM programs, and 511NY should collaborate to develop traveler information that will become a resource for users of all modes of transportation and will coordinate with 511NY operations to ensure information is up-to-date.
- Identify opportunities for use of web-enabled applications that provide real-time information and coordinated billing for transportation services on all modes across the Region.

▶ **Who are Potential Leads and Key Partners for This Action?**

The Region's three MPOs, Way2Go operators, other TDM programs, county staff, NYSDOT, and 511NY are candidates to serve as key leaders for this action. Important partners will include rideshare and car share organizations, transit operators, employers, institutions, and regional planning and development boards.

▶ **How Would Funding be Used?**

An effective TDM marketing, outreach, and operations program requires marketing and outreach staff and materials, as well as software, equipment, and technical staff or consultants for information management and web applications. The costs of implementing and maintaining a Way2Go program, including staffing, can be hundreds of thousands of dollars annually for a county, but by consolidating all TDM operations through one regional organization, costs can be significantly reduced. Having a single regional Way2Go program would be less expensive than having multiple programs across the Region, but should still allow for customization of messaging and marketing materials for geographic sub-areas.

▶ **Examples and Potential Projects**

- Broome-Tioga GreenRide is a free, internet-based rideshare matching service sponsored by the Binghamton Metropolitan Transportation Study (the Binghamton MPO). GreenRide helps commuters find carpool partners by searching for others in neighboring communities that have similar schedules and commuting preferences.
- Ithaca Zimride is a similar program offered in Tompkins County including on the campuses of Cornell and Ithaca College. Both the Ithaca and Binghamton regions are developing bikesharing systems, which support transit and carpooling use.

Encourage adoption of green fleet policies for public and private fleets (Action 17)

Estimated GHG Reductions: 262,000 MTCO_{2e} Annually by 2032

(for Actions 17 and 18 combined)

▶ Why Take This Action?

Local governments, businesses, and agencies in the Southern Tier can develop policies to better utilize existing fleet vehicles and plan for future acquisitions to increase fuel economy, achieve long-term cost savings, and reduce emissions. These policies will need to be context-specific to ensure that agencies are able to carry out their missions. In the case of police departments, some patrols may require powerful vehicles, while prisoner transport may be accomplished with hybrid vehicles. Establishing green fleet policies helps agencies plan for and prioritize their fleet investments over time, analyzing the benefits for each vehicle type and age, and developing incentives and budget allocations to transition to greener fleets as vehicles are replaced. Successful public agency investments in green fleets can test new options, helping commercial owners to understand and track the benefits of green fleet policies that can work in the private sector as well.



In the Southern Tier, transportation accounted for 40 percent of total energy consumption and 37 percent of all GHG emissions in 2010. Green fleets are direct and fairly quick means for reducing transportation GHGs, because alternative fuel, hybrid, and electric vehicles use less gasoline and diesel -- the sources that produce GHGs in vehicles. The rural nature of the Region means that many fleet vehicles as well as school district buses travel long distances, making this action that much more important for fuel efficiency and related cost savings, air quality benefits, and GHG reductions. Other municipalities, such as Seattle and Issaquah, Washington, that have upgraded to greener fleets have reduced GHG emissions by several thousand tons and realized long-term savings on fuel costs.

Over the long run, this action will increase public and business awareness of the benefits of fuel-efficient vehicles and may lead private companies to adopt similar policies, as well as inspire individual green vehicle purchases. This action will expand green transportation, which is a strong and growing niche sector in the Southern Tier's manufacturing base. Construction of infrastructure to service green fleets will also generate jobs in the Region.

▶ What Can Be Done?

Once implemented, green fleet policies provide an opportunity to evaluate the condition of the fleet, including age, fuel efficiency, and usage; consider whether reduction of fleet is possible; and make targeted purchasing decisions that include consideration of alternative fueled and alternative technology vehicles to meet the heaviest demand areas and gain the greatest cost and fuel efficiency possible. Opportunities to collaborate and consolidate fleets between schools and transit providers and among local governments for vehicles and heavy operation fleets should be explored to reduce municipal and organizational costs and to efficiently utilize fleets. Just north of the Southern Tier, Monroe County Fleet Division has been ranked the 2nd best Government "Green Fleet" in North America by Government Fleet magazine, and is available as a model for local policies and fleet deployments.

▶ What are the Barriers to Taking This Action and How Will They be Overcome?

- Cost, administration, and duplicative fleets across jurisdictions and entities are the three key barriers to greening a fleet. Developing policies is a fairly easy task and there are excellent models in New York State and nationwide for guidance. However, since there are few examples of green fleet policies in the Southern Tier, comfort with such policies is a barrier to overcome.
- In addition, aligning policies with implementation budgets can be challenging.

- Business practices of key partners need to be evaluated and may prove a challenge for changing some fleets, such as police departments with high gasoline consuming vehicles due to engine size and capacity deemed necessary for police duties.
- Administering a central fleet, when fleets are often small and managed by individual government agencies in the Region, is another barrier to be overcome. To right-size and green a fleet, central review is needed to reduce total fleet size, implement vehicle sharing, and evaluate the condition of the fleet as a whole to make the best budgetary decisions about new vehicles and sale of old vehicles. Many jurisdictions, such as villages and towns, have duplicative fleets that, in many cases, can only be utilized within jurisdictional boundaries.
- These barriers may be eliminated through collaborative ad hoc working groups that share the experience of green fleet owners with other jurisdictions that are new to the details of such work.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

Expanded use of alternative-fueled vehicles in fleets and by individuals will reduce gasoline sales and GHG emissions. If 10 percent of the region's vehicle miles traveled is shifted from conventional vehicles to electric vehicles over 20 years, this measure will reduce regional emissions by 262,000 MTCO₂e, or 8 percent of the Plan's estimated GHG reduction benefits (calculated with action 18). This calculation is based on the mid-point performance of electric vehicles currently on the market. The reduction was calculated based on the difference between 10 percent of current on road emissions and the emissions associated with the electricity requirement to meet 10 percent of vehicle miles traveled.

In addition, adoption of this action by municipalities may make it more likely that they will become Climate Smart Communities, and will help existing CSCs meet the goals they have pledged to keep.

▶ **Recommended Next Steps**

- Regional agencies and county governments should develop example policies and methodologies to reduce emissions through methods that take the agencies' responsibilities into account (including analyzing vehicle purpose, fleet age, fuel use, and other decision factors).
- Municipalities and agencies can modify and adopt policies that meet their fleet needs and require their use in administrative decisions made about vehicles.
- Administrators can identify the fleets and vehicle types with the biggest potential for GHG reductions and develop fleet replacement plans and budgets to achieve long-term goals.

▶ **Who are Potential Leads and Key Partners for This Action?**

Potential leads include regional agencies and local governments with vehicle fleets, particularly Solid Waste, Public Works, Highway Divisions, and Police Departments. Key partners with fleets in the community include school districts, transit operators, universities, and large employers.

▶ **How Would Funding be Used?**

Little to no additional funding should be required for policy development. Up-front premiums of \$5,000 and more for hybrids and alternative fuel vehicles can be expected for replacing traditional cars in municipal fleets. Bus fleet conversion is more expensive for hybrids and alternative fuels; price differentials can be more than \$250,000 per bus vs. conventional buses.¹⁰ Although fuel efficiency is much greater for hybrid and alternative fuel buses, it can take over two decades to recoup the up-front premium of purchasing hybrid or alternative fuel buses. Retrofitting heavy trucks and off-road vehicles for alternative fuels usage is another option, though it can be costly and municipalities can face regulatory and other barriers to this process.

¹⁰ EESI, "Hybrid Buses: Costs and Benefits," http://www.eesi.org/files/eesi_hybrid_bus_032007.pdf.

▶ Examples and Potential Projects

In 2009, Tompkins County passed a resolution requiring all County departments with vehicle fleets to adopt a combination of strategies to reduce greenhouse emissions such as replacing the highest emitting vehicles first and increasing the use of alternative fuel vehicles. This is expected to result in a 10 percent reduction in GHG emissions for Tompkins County government operations over the next five years.

Create a region-wide electric vehicle and alternative fuel infrastructure deployment plan (*Action 18*)

Estimated GHG Reductions: 262,000 MTCO_{2e} Annually by 2032

(for Actions 17 and 18 combined)

▶ Why Take This Action?

The Southern Tier faces a multitude of challenges and opportunities with regard to transportation and its effects on greenhouse gas emissions, costs, and the ability of residents to get to work, services, and other activities. Because established land use patterns and infrastructure are oriented toward automobile use in much of the Region, and the majority of the population lives in low-density rural areas, options are needed to reduce the transportation sector's impact on both household costs and the environment. This sector is a large consumer of energy and high emitter of GHGs in the Region, particularly due to the fact that many residents must travel long distances to reach employment, medical and other services, and amenities. Given that driving alone is the most common way for most Southern Tier travelers to reach their destinations, enhancing vehicle energy efficiency is critical to reducing regional GHG emissions.



Electric and alternative fuel vehicles can significantly reduce the use of fossil fuels and associated GHG emissions, particularly if the energy source is derived from renewable sources. Electric vehicles are gaining some traction across the U.S. – with currently more than 14,500 electric vehicle charging stations.¹¹ The external factors that influence transportation choices, particularly gas prices, which are projected to rise, will likely support this action. Even with increased vehicle fuel efficiency for conventional cars, many electric vehicles and alternative fuel vehicles are still more efficient. Other benefits of this action include the economic stimulus of infrastructure planning and construction, potential long-term fuel cost savings, and heightened public awareness of opportunities to improve air quality. In addition, construction of electric and alternative fuel facilities as well as continuing research, development, and local manufacturing of these vehicle components is anticipated to increase jobs in the Region for workers with a variety of technical and manufacturing skills.

▶ What Can Be Done?

A region-wide plan for electric and alternative fuel vehicles will identify cost-effective opportunities to expand needed infrastructure; in many cases, charging stations can be incorporated into planned or existing facilities such as parking garages. Regional agencies can help identify and plan for this project. The deployment plan should analyze the most appropriate alternative fuel and electric vehicles for the Region, identify any updates to zoning or permitting processes required, determine available funding sources, and identify other potential challenges and possible solutions.

¹¹U.S. DOE, "Alternative Fueling Station Counts by State," http://www.afdc.energy.gov/fuels/stations_counts.html.

▶ **What are the Barriers to Taking This Action and How Will They be Overcome?**

- A large barrier to deployment of alternative transportation fleets is the lack of regional and national infrastructure to support their use. Electric vehicles require availability of charging stations – both at home and around town – and some alternative fuel vehicles require specialized infrastructure as well. In addition to electric vehicles, fuels such as biodiesel, compressed natural gas, and hydrogen fuel cells may need the support of a regional infrastructure plan to be effective alternatives.
- State agencies such as NYSDOT and NYSERDA will be important partners to the success of this action, as infrastructure may need to be organized and rolled out systematically across service areas.
- A complete inventory of current facilities and prioritized infrastructure network plan to coordinate and deploy public and private investment will help overcome these barriers.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

Creating and implementing an electric and alternative-fuel vehicle infrastructure network plan will help increase use of alternative-fueled vehicles, and will reduce gasoline sales and GHG emissions. If 10 percent of the region's vehicle miles traveled is shifted from conventional vehicles to electric vehicles over 20 years, this action will reduce regional emissions by 262,000 MTCO₂e, or 8 percent of the Plan's estimated GHG reduction benefits (calculated together with action 17). This calculation is based on the mid-point performance of electric vehicles currently on the market. The reduction was calculated based on the difference between 10 percent of current on road emissions and the emissions associated with the electricity requirement to meet 10 percent of vehicle miles traveled.

In addition, adoption of this action by municipalities may make it more likely that they will become Climate Smart Communities, and will help existing CSCs meet the goals they have pledged to keep.

▶ **Recommended Next Steps**

- Identify costs to institutions and consumers of purchasing alternative fuel and electric vehicles, taking programs such as the Federal Qualified Plug-In Electric Drive Motor Vehicle Tax Credit and local infrastructure currently in place into account.
- Conduct a detailed mapping and analysis of placement of charging stations identifying potential neighborhood impacts and availability of refueling options.
- Concurrently, engage communities and key stakeholders, such as governments and schools that have large vehicle fleets, to determine a realistic plan that can be successfully implemented.
- As facilities are developed, provide safety and technical education for utilities staff.
- As appropriate, seek out opportunities to incorporate new infrastructure into development or redevelopment projects.

▶ **Who are Potential Leads and Key Partners for This Action?**

Organizations suited to lead this effort are MPOs, regional planning and development boards, and county governments. These regional leaders will need to work in close partnership with NYSDOT and NYSERDA to develop this new transportation energy infrastructure.

▶ **How Would Funding be Used?**

A plan could be developed by an ad hoc interagency staff working group, such as area MPOs, but also may require funding for consultant assistance. In addition to plan development, funds to actually build the infrastructure will be required. Electric vehicle charging stations can cost between \$3,000 and \$15,000 to install, depending on labor and permitting costs. Alternative fuel infrastructure costs vary depending on the type of fuel; the plan should identify all options and include cost-benefit analysis to select the most appropriate fuel types to deploy, as well as the most appropriate locations in which to site infrastructure.

▶ Examples and Potential Projects

- There are currently three localities in the Southern Tier with electric vehicle charging stations – Horseheads, Ithaca, and Vestal. Providing electric vehicle charging stations in most population centers will be necessary to make the use of electric vehicles a viable option for many residents.
- In 2012, NYSERDA provided \$228,000 to the City of Rochester to install 24 charging stations,¹² and NYSDOT has a CNG fueling station in Binghamton that operates 24 hours per day.¹³

LAND USE AND LIVABLE COMMUNITIES

Encourage development and strategic investment in cities, villages, and hamlets (*Action 19*)

Estimated GHG Reductions: 17,000 MTCO₂e Annually by 2032 for infill growth and land use strategies

▶ Why Take This Action?

Many Southern Tier cities, villages, and hamlets were built more than a century ago to meet the needs of a mostly pedestrian population. These communities have downtown and main street areas that were built before automobile travel. The Southern Tier's six cities and 59 villages mostly have historic Main Streets and commercial districts adjacent to compact neighborhoods. These communities have two key ingredients necessary to support a livable community: walkable centers and a mix of land uses. Developing in existing population centers capitalizes on existing public and private investments in water and sewer infrastructure; streets, sidewalks and highways; and houses, businesses, schools, and services.



Revitalization of downtowns and main streets will have a direct impact on expanding economic opportunities. Enhancing core areas helps support new housing, economic development, and expanded choices for transit, walking, biking, and carpooling. Cost savings are key benefits to developing and investing in cities, villages, and hamlets, as the cost of developing housing, on a per unit basis, can be significantly less than in rural and suburban areas. Residents of downtowns and main street areas also spend less than their rural counterparts on transportation. In addition, this strategy will support reduction of public costs to taxpayers, as the cost of maintaining fewer linear feet of infrastructure is less expensive, and those costs may be shared among more customers in more densely developed areas. Implementing this action also may yield jobs, particularly in the construction and transportation sectors.

Focusing development on areas already serviced by infrastructure will reduce emissions as compared to development in greenfield and peripheral areas. Providing residential units near transit decreases the amount and distance of driving required to reach work, leisure, and other destinations. The average American city has a

¹² Adams, Thomas, "Rochester Gets Money for Electric Car charging Stations," *Rochester Business Journal*, June 6, 2012, <http://www.rbj.net/article.asp?aID=191489>

¹³ FindTheData, "Clean Energy – New York State Department of Transportation in Binghamton, NY – Alternative Fuel Station," <http://alternative-fuel.findthedata.org/4441/Clean-Energy-New-York-State-Department-of-Transportation-Binghamton-NY>.

per capita carbon footprint that is 14 percent smaller than the national average,¹⁴ with greater reductions possible as density and transit options increase.

▶ **What Can Be Done?**

Creating and strengthening walkable and livable centers with a variety of transportation choices requires focusing development resources on cities and villages that are served by existing infrastructure. Local governments, economic development entities, and planning bodies can target resources toward main streets and downtown neighborhoods to make the areas attractive for private investment. These include streetscape, pedestrian, bicycle, infrastructure, and design improvements as well as incentives to encourage private investment. This action item should be carefully coordinated with any transportation improvement projects in the Region, as each can benefit from and support the other.

▶ **What are the Barriers to Taking This Action and How Will They be Overcome?**

- Improvements in main streets and downtown areas can be costly, which can be a challenge for communities in the Region that are facing reduced population and property values.
- In addition, many cities and villages in the Southern Tier have land use regulations and processes in place that facilitate suburban-style development while making it difficult to build to historic neighborhood standards, effectively discouraging development and redevelopment at the densities needed to support revitalized downtown and main street districts.
- Many municipalities do not have planning staff and technical assistance resources are limited. Training provided by the regional planning agencies can share successes and lessons learned among municipal planners, developers, and elected officials.
- Additional technical assistance and extensive public, business, and developer input can help municipalities in the Region update comprehensive plans and create neighborhood revitalization plans. This will help build support for updating zoning, subdivision, and site plan regulations, adopting plans and design guidelines, prioritizing infrastructure investments, and approving innovative development proposals.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

Reinvesting in downtowns will enhance demand for housing and services and make it more likely that developers will increase the supply of housing in strategic downtown and main street locations. This added density will also increase walking, biking, and transit use. In addition, this action will help achieve the target of increasing the proportion of residents who live in existing cities and villages; and of decreasing annual gasoline sales of 310 million gallons by 2.5 percent in 5 years and 40 percent in 20 years. Cities and villages have a lower per capita vehicle miles traveled than less-densely populated areas, and an increase in population in higher density areas would result in lower total vehicle miles traveled. Actions 19 to 23 would collectively reduce regional emissions by an estimated 17,000 MTCO₂e, though this is likely underestimated due to limitations in the inventory data. This is 0.5 percent of the Plan's estimated GHG reduction benefits.

▶ **Recommended Next Steps**

- Review existing land use regulations to ensure they support priority development area strategies and do not impose unnecessary barriers to infill development.
- Identify priority development areas in which to focus redevelopment resources and obtain buy-in from municipal leaders to support the strategy through plans and updated regulations.
- Formulate and implement a plan to engage residents and stakeholders to identify the improvements that are most necessary to attract private investment and economic activity.
- Once focus areas are determined, work with local businesses to organize events that highlight main street or downtown assets such as businesses, cultural, and recreational opportunities.

¹⁴ Ensha, Azadeh, "The Comparatively Green Urban Jungle," *The New York Times*, April 1, 2009, <http://green.blogs.nytimes.com/2009/04/01/the-comparatively-green-urban-jungle/>.

- Schedule improvements and coordinate capital investments in priority development areas.
- Share the results of the work with peers in the Region.

▶ **Who are Potential Leads and Key Partners for This Action?**

The principal leads will be local government officials, both elected and appointed, and local and regional planning staff. Several municipalities within the Region are already actively engaged in developing strategies to attract development in downtown cores, and it is envisioned that they would help inspire others to do so, as well. Key partners are local businesses, economic development agencies, private and non-profit developers, residents, and property owners. Activities should be coordinated with state agencies that might serve as project partners, such as Departments of Transportation, Environmental Conservation, and Economic Development, including the Southern Tier Regional Economic Development Council.

▶ **How Would Funding be Used?**

Funding will be needed for developing revitalization plans and updating codes and regulations. This can be done cost-effectively by working with regional agencies to develop model codes (see Action 23 and Governance section). Improvements to downtown and main street areas, such as transit enhancements, infrastructure upgrades, and housing construction can be costly. Some of the costs could be leveraged by redirecting public expenditures to priority development areas, supplemented by coordinated developer investments. Increased tax revenue can be expected from new and expanded businesses and housing in the area, but there is a time lag between project onset and actual receipt of this revenue. There are some state and federal funds available for streetscape and main street improvements. Additional funds may be required for technical assistance to municipalities.

▶ **Examples and Potential Projects**

- Residents have expressed an interest in revitalizing their historic areas to make them more livable, walkable, and vibrant. Binghamton Downtown, the Livable Communities Alliance in Broome and Tioga Counties, Elmira Downtown Development, and Corning's Gaffer District all seek to promote the strengthening of downtown and core areas.
- The Downtown Ithaca Alliance created the Downtown 2020 Plan to encourage greater transportation choices and increased housing density.
- The Finger Lakes Wine Festival in Watkins Glen attracts visitors, boosts economic activity, and highlights the products of local businesses. This action can build on the work and successes of these initiatives, as well as county-level planning that has identified preferred infill redevelopment areas already served by infrastructure.

Update local land use regulations and design codes and provide technical assistance to implement projects (Action 23)

Estimated GHG Reductions: 17,000 MTCO_{2e} Annually by 2032 for infill growth and land use strategies

▶ **Why Take This Action?**

Livable communities are compact and walkable places with mixed-use neighborhoods offering a variety of housing types, commercial and community services, employment opportunities, and transportation choices. Updates to land use and development regulations are critical for focusing future growth in priority development areas to support livable communities. Creating an updated set of codes that is easy to use and understand and provides clear direction to developers about community needs and desires can reduce concerns about potential impacts of development.



Overall, there are many benefits to developing compact, livable communities. These include achieving efficiencies in providing services like transit, waste removal, and infrastructure, thus saving limited fiscal resources. The decrease in energy use from these efficiencies results in fewer GHG emissions while more residents are able to conveniently walk, bike, or use transit. Livable communities provide opportunities for increased social interaction within the community. Compact development also supports conservation of natural resources, by preventing sprawling development on working lands and open space. Another benefit of updating development regulations and design standards to support improvements in walkability and transit service is that this can reduce the cost to local governments and taxpayers by getting development built right in the first place, rather than having to add desired features later. A well-designed and appealing community will also attract businesses and residents and improve and diversify downtowns and neighborhoods.

▶ **What Can Be Done?**

There are many successful examples of small communities around the country using updated land use regulations and other programs to support desired development patterns. Form-based codes, smart design standards, and transit-ready street improvements will make the Region's villages and hamlets more walkable, livable, and ultimately, sustainable. Southern Tier governments and agencies can develop a technical assistance program and toolkit of resources that incorporate the unique architectural characteristics, culture, and history of the Region's communities. Local officials, community leaders, residents, and business owners can work together to strengthen regulations and codes that will help achieve the community's vision. With multi-jurisdictional collaboration and pooled resources, the Southern Tier can promote walkable land use patterns in hamlets and villages and enhance economic competitiveness.

▶ **What are the Barriers to Taking This Action and How Will They be Overcome?**

- While most communities in the Southern Tier have developed comprehensive plans, some of these are out of date and others fail to provide a broad vision of how priority areas should be developed.
- In addition, Southern Tier villages and hamlets often have limited access to planning staff and implementation resources to update their codes. This barrier can be addressed by assisting municipalities in hiring experts to develop plans and regulation, creating stronger connections between rural municipalities and planning schools in the Region to encourage class projects assisting municipalities, and regional planning agencies' sharing regulatory models and codes, as well as lessons learned, among municipalities in the Region.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

Updating plans and codes can make it easier for developers to increase the supply of housing in strategic downtown and main street locations, helping to increase the proportion of residents who live in existing cities and villages from 38 percent to 40 percent over the next 5 years and to 45 percent in 20 years. In addition, this action will help achieve the target of increasing the percentage of workers commuting via walking, biking, transit, and carpooling and of decreasing annual gasoline sales. Cities and villages have a lower estimated per capita vehicle miles traveled than the less-densely populated portions of the region, and an increase in population in higher density areas would result in lower total vehicle miles traveled. Actions 19 to 23 would collectively reduce regional emissions by an estimated 17,000 MTCO₂e, though this is likely an underestimate due to limitations in the inventory data. This is 0.5 percent of the Plan's estimated GHG reduction benefits.

▶ **Recommended Next Steps**

- Create a method for sharing funding opportunities and free and low-cost planning assistance among municipalities in the Region.
- Increase training in the Region for local officials working on comprehensive plans and regulations.
- Engage cities, towns, and villages, the public, landowners, and developers to develop or update comprehensive visions for their communities to include walkable, mixed use areas for focused development or redevelopment.

- Share information with the public and planning boards about available tools for achieving a vision, including land use regulations, form-based codes, and design standards.
- Regional agencies and counties can work with smaller jurisdictions to develop resources for enhancing livability in communities. Through a series of pilot projects, this coalition can provide technical assistance and develop an online toolkit with sample land use regulations, form-based codes, and design standards.

▶ **Who are Potential Leads and Key Partners for This Action?**

The principal leads will be local government officials, both elected and appointed, and local and regional planning staff. Key partners include businesses, residents, property owners, developers, and economic development agencies. Regional and county planning agencies can also provide technical assistance. Activities should be coordinated with state agencies that might serve as project partners or funders.

▶ **How Would Funding be Used?**

While the cost of developing and updating codes and regulations is moderate, smaller communities often have no regular funding or full-time staff allocated to planning activities. Funding allocated to regional planning and development boards or counties could be effectively used to develop methods to share funding opportunities, connect municipalities to low-cost planning assistance, and hire ‘circuit rider’ staff or consultants to develop example codes, regulations, and policy templates that can be customized and used by towns and villages. Collaboration across the Region to provide technical assistance and shared resources can increase the cost effectiveness of these investments.

▶ **Examples and Potential Projects**

- The Hamlet of Varna, in Tompkins County, involved community residents, business owners, and local government officials to prepare the Varna Community Development Plan. This plan prepared a vision for future development and redevelopment in the hamlet and included design guidelines, landscape standards, and zoning amendments to help achieve that vision. The planning process included charrettes with community members and grew out of an intermunicipal corridor management plan for the Route 13/366 corridor.
- Good references for developing more sustainable zoning codes are EPA’s *Essential Smart Growth Fixes for Urban and Suburban Zoning Codes*¹⁵ and the companion *Essential Smart Growth Fixes for Rural Planning, Zoning, and Development Codes*.¹⁶

Provide financial and technical assistance to rehabilitate housing for low-to-moderate income households (Action 25)

Estimated GHG Reductions: 66,000 MTCO₂e Annually by 2032 for housing energy efficiency strategies

▶ **Why Take This Action?**

The housing stock in the Southern Tier is aging. Nearly 60 percent of all housing units were built before 1960, which means that they were constructed before building codes that take energy efficiency into account were implemented and enforced. Many of these units need significant repairs and upgrades to bring them up to code, and even more investment is required to enhance their energy efficiency.



¹⁵Essential Smart Growth Fixes for Urban and Suburban Zoning Codes, U.S. EPA. http://www.epa.gov/dced/essential_fixes.htm

¹⁶ Essential Smart Growth Fixes for Rural Planning, Zoning, and Development Codes, U.S. EPA. http://www.epa.gov/dced/pdf/rural_essential_fixes_508_030612.pdf

Many low- and moderate-income households lack the funds needed to enhance their homes' energy efficiency, yet would benefit significantly from the resulting reduced energy costs. This action focuses on the rehabilitation of small single-family homes, manufactured housing, and 2-4-unit multifamily properties. This action would supplement and support the programs provided by New York State and various Federal agencies to retrofit and upgrade housing inhabited by low-to-moderate income households. While New York residents are fortunate to have access to programs such as NYSERDA's Home Performance, Home Performance with ENERGY STAR, EmPower, Multifamily Performance Program, Green Jobs Green NY, and the Federal Weatherization Program, there is still need for a flexible, stable, and local-oriented program to help this population. State and Federal programs may or may not be funded from year to year, and often include requirements and paperwork that limit the number and type of people who can participate in the programs. A focus of this action will be to fill gaps identified in State and Federal programs. One example of such a gap is that weatherization programs will not install insulation unless roofs are in good repair, but do not pay for roof replacements. This action could provide financing targeted to fill those gaps. For example, financing could be provided to repair roofs which would allow homeowners to be able to take advantage of State and Federal programs for which they are otherwise qualified.

Subsidy programs for these upgrades should have clearly stated, overarching goals, such as reducing energy consumption by a specific percentage or rehabilitating a certain number of units to a specific standard, and should be flexible enough to accommodate variety in eligible types of housing, rehabilitation activities, and construction materials. These actions will not only alleviate challenges associated with housing and energy cost affordability, but will also help to address regional concerns about vacancy and abandonment of housing units.

▶ **What Can Be Done?**

This action will invest in technical assistance programs that provide resources to low-to-moderate-income households, particularly households living in small homes, manufactured housing, and 2-4 unit multifamily properties. Enhanced building code enforcement for rented properties, which are more likely to be occupied by low-to-moderate-income households, will be necessary to provide an incentive for landlords to ensure that their properties are in compliance and safe for renters.

▶ **What are the Barriers to Taking This Action and How Will They be Overcome?**

- Barriers to implementation of this action include lack of sufficient funding to rehabilitate the extensive supply of older housing, especially those properties owned by low- to moderate-income households who have little disposable income to invest in energy efficiency, but the most to gain in terms of reducing the percentage of income spent on home heating and light.
- Another barrier to this action is that manufactured housing units are often not eligible for subsidy programs that will help finance energy efficiency improvements. Funding for the energy efficiency portions of renovations can typically be recouped over time from energy cost savings, but funding for code and safety improvements will require more creative financing options.
- These barriers could be addressed by applying for capital to seed a revolving loan fund, grants to assist low-to moderate-income households in weatherization and code and safety improvements, and concentrating weatherization/rehabilitation resources on approved housing types while working to create innovative financing mechanisms to rehabilitate manufactured housing.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

Rehabilitating housing units in the Region will enhance the housing supply, which will provide more options to all residents and will prevent the price of housing from escalating as much as it otherwise would. Rehabilitating housing in existing downtowns will also help make living downtown more attractive. Reducing energy costs for low-to-moderate-income households will make the combined impact on household budgets of housing and utility costs more manageable. Other targets associated with this action include: increasing the percentage of Southern Tier residents living in existing cities and villages and reducing building energy consumption by 10 percent in the residential sector in 5 years and by 40 percent in the residential sector in 20 years.

Collectively, actions 24 to 27 would overlap significantly with the energy efficiency retrofits proposed under action 1. All retrofits were calculated under that measure, so benefits calculated here apply only to new housing units that are more energy efficient than the units they replace. In the context of the new housing units needed in the cities and villages to accommodate the target growth there, assuming that new units are 50 percent more energy efficient than existing units, these actions will reduce regional emissions by 66,000 MTCO₂e, or two percent of the Plan's estimated GHG reduction benefits.

▶ **Recommended Next Steps**

- Identify all programs in place to assist low- and moderate-income households in rehabilitating their housing to make it more energy efficient and compliant with building codes. Coordinate and expand existing programs, and develop new programs where needed.
- Work with organizations with experience obtaining financing for home improvements by borrowing against future energy cost savings; identify opportunities for cooperation and expansion of these services.
- Consider establishing a revolving loan fund to support financing improvements, especially for housing ineligible for other subsidy programs.
- Work with municipal code enforcement officials to identify areas of greatest need and enhance compliance by providing education, technical assistance, and financing.

▶ **Who are Potential Leads and Key Partners for This Action?**

Potential leads include local municipalities and housing agencies, with support from regional and state agencies. Contractors providing energy efficiency services have an interest in increasing the demand for their services through alternative financing mechanisms and may be willing to work with housing and municipal leaders to provide low-to-moderate-income households with payment plans that spread the cost of the upgrade over a number of years. Local financial institutions and foundations may also be able to enable flexible repayment plans by providing low-interest loans.

▶ **How Would Funding be Used?**

Funding is needed for staff to apply for grants, create programs to assist households in manufactured homes and address code and safety issues, conduct outreach, and provide technical assistance. The cost of rehabilitating or weatherizing existing housing can often pay for itself over time, especially for older homes which often have the greatest need for energy efficiency improvements. The DOE estimates that for every dollar it invests in its Weatherization Assistance Program, it achieves \$2.51 in benefits, including \$1.80 savings on energy bills.¹⁷ According to the DOE, Federal weatherization programs have reduced low-income families' annual expenditures on heating and cooling by an average of \$437.¹⁸

▶ **Examples and Potential Projects**

- In June 2012, the Southern Tier Regional Economic Development Council announced the implementation of 11 housing rehabilitation and community development projects that will restore and rehabilitate homes for 205 families in Broome, Chenango, Steuben, Schuyler, and Tompkins Counties.
- The New York State Office of Housing and Community Renewal's (NYSOHCRC) Weatherization Assistance Program (WAP) provides financial assistance to households earning less than 60 percent of state median income; for a family of four, the annual income limit is \$49,332.
- NYSERDA's EmPower New York also provides similar assistance to residents of the Southern Tier and other regions.

¹⁷ Weatherization Assistance Program Technical Assistance Center, "Weatherization Assistance Program Overview," <http://www.waptac.org/WAP-Basics.aspx>.

¹⁸ U.S. Department of Energy, "Weatherization and Intergovernmental Program," <http://www1.eere.energy.gov/wip/wap.html>.

Provide technical assistance and gap financing for construction and rehabilitation of new energy-efficient affordable housing (*Action 27*)

Estimated GHG Reductions: Not possible to quantify

► Why Take This Action?

Housing in the Southern Tier is generally considered affordable¹⁹ compared to housing in the rest of the State, and slightly more affordable than the national average. Still, nearly half of all renters and over 20 percent of homeowners spend more than 30 percent of their income on housing costs, and thus do not live in housing that is considered affordable. In addition to high housing costs, heating and energy use is also a significant expenditure for many households. This action aims to engage developers and property owners to invest in rehabilitating existing affordable housing to improve energy efficiency and to construct new, energy-efficient affordable housing to meet the Region's housing needs and energy goals, using technical assistance and financing opportunities.



This action would supplement and support the programs provided by New York State and various Federal agencies to retrofit and upgrade housing inhabited by low-to-moderate income households. While New York residents are fortunate to have access to programs such as NYSERDA's Home Performance, Home Performance with ENERGY STAR, EmPower, Multifamily Performance Program, Green Jobs Green NY, and the Federal Weatherization Program, there is still need for a flexible, stable, and local-oriented program to help this population. State and Federal programs may or may not be funded from year to year, and often include requirements and paperwork that limit the number and type of people who can participate in the programs. A focus of this action will be to fill gaps identified in State and Federal programs.

The rehabilitation and development of new energy efficient housing will significantly reduce households' energy bills as energy consumption is reduced. In turn, this will reduce the Region's overall building energy usage. In the Southern Tier, 28 percent of all energy consumed is from residential buildings, so any savings in this area will have significant effects. Furthermore, locating housing in priority development areas will improve residents' accessibility to less energy-intensive forms of transportation (i.e. transit, walking, and biking) and reduce the need for driving trips, which can be very long in some parts of the Southern Tier. Because residents often travel by single-occupancy vehicle, reducing trips can also significantly reduce GHG emissions from the transportation sector. Other benefits from this action include increasing the regional energy efficient housing supply, heightening community awareness about the ways to reduce residential energy consumption by increasing energy efficiency, and catalyzing downtown redevelopment through the development of housing in key locations. This action is also anticipated to generate up to 34 new green construction jobs annually, averaged over the lifetime of the project, particularly for home building and maintenance, including skilled trades, and for energy efficiency workers.

► What Can Be Done?

This action can be accomplished through the creation of a network of education, outreach, and financing resources to subsidize the development of energy-efficient affordable housing units. One example of local financing is the Housing Fund of Tompkins County, established in 2009 to help communities and organizations respond to the diverse affordable housing needs of residents and the lack of sufficient affordable housing in the

¹⁹ According to the U.S. Department of Housing and Urban Development, "The generally accepted definition of affordability is for a household to pay no more than 30 percent of its annual income on housing. Families who pay more than 30 percent of their income for housing are considered cost burdened and may have difficulty affording [other] necessities."

County. The fund supports projects that encourage sustainable, affordable living – taking the direct cost of the housing unit as well as transportation and energy costs into account – particularly in the County’s priority development areas. The Housing Fund is a six-year partnership between Cornell University, the City of Ithaca, and Tompkins County.

▶ **What are the Barriers to Taking This Action and How Will They be Overcome?**

- Overall, the limited available funding as compared to needs is the largest barrier. In addition to state funding provided by NYSOHCR’s programs for affordable housing development, there are few local financing support mechanisms to assist in these projects. Energy efficiency is now more commonly considered in affordable developments, though not all funding is aligned to consider energy costs in calculating affordability.
- The Southern Tier has strong local knowledge and experience in developing affordable housing and implementing energy efficiency programs, but these areas have not yet been fully aligned.
- Establishing a revolving loan pool of flexible funding to provide gap financing and energy system upgrades on major projects, as well as better coordination and information sharing among housing and weatherization agencies, would help overcome these barriers.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

This action would increase the percentage of housing units located within cities and villages that are affordable to low-to-moderate-income households from 37 percent in 2010 to 38 percent in 5 years and to 42 percent in 20 years. Other targets associated with this action include: increasing the percentage of Southern Tier residents living in existing cities and villages; and reducing building energy consumption by 10 percent from 25 trillion Btu in the residential sector in 5 years and by 40 percent in the residential sector in 20 years.

Collectively, actions 24 to 27 would overlap significantly with energy efficiency retrofits proposed under action 1. All retrofits were calculated under that measure, so benefits calculated here apply only to new housing units that are more energy efficient than the units they replace. In the context of the new housing units needed in cities and villages to accommodate target growth, assuming that new units are 50 percent more energy efficient than existing, these actions will reduce regional emissions by 66,000 MTCO₂e, or 2 percent of the Plan’s estimated GHG reduction benefits.

▶ **Recommended Next Steps**

- Evaluate the local housing demand against the current housing supply. Gaps in downtowns for affordable, energy efficient housing should be noted to determine where focused development might meet the needs of the local population.
- Harness the expertise of developers experienced in affordable and energy efficient housing development to gather information about opportunities for collaboration, common challenges, and resources like existing energy efficiency programs.
- Coordinating with Action 19, prioritize efficient locations for future affordable, energy efficient housing development and identify barriers and solutions to development in these areas.
- Identify ways to direct housing and energy efficiency funds toward key developments.

▶ **Who are Potential Leads and Key Partners for This Action?**

Leaders for this action include local governments, housing agencies, private and non-profit housing developers, and weatherization agencies. Key partners will be the NYSOHCR and the U.S. Department of Housing and Urban Development (HUD).

▶ **How Would Funding be Used?**

Costs for activities during project planning and pre-development will include staff time or consultant assistance to find development sites, conduct market studies and financial analyses, provide technical assistance to community-based developers, and assist with project design and approvals. Local governments can also

establish revolving loan funds, community development districts, and other financing mechanisms to subsidize the costs of incorporating sustainability features.

▶ **Examples and Potential Projects**

The partnership of Ithaca Neighborhood Housing Services and PathStone Corporation has begun construction of Breckenridge Place, a 50-unit, LEED-certified energy efficient development; most units will be priced for residents earning less than 60 percent of the county median income. In addition to providing needed affordable housing, the development, which is the first affordable housing project in Ithaca's downtown in over 40 years, will help revitalize the downtown area. This housing development is a NYS tax credit project that successfully applied a local financial tool – the Housing Fund – to gain proof of local financial support.

ECONOMIC DEVELOPMENT

Implement the Energy Workforce Development Initiative (*Action 28*)

Estimated GHG Reductions: Not possible to quantify

First proposed in the Southern Tier Regional Economic Development Council's Strategic Plan

▶ **Why Take This Action?**

The Energy Workforce Development Initiative proposed by the Southern Tier Regional Economic Development Council (REDC) will develop a highly qualified workforce that is prepared to respond to the opportunities resulting from the emergence of the energy industry in the Southern Tier.

This Initiative will provide training and specialized skills to build the workforce needed to perform energy efficiency building retrofits and to install renewable energy systems. The Initiative will also prepare workers for employment opportunities in the management, development, operation, and maintenance of complex energy and industrial processes. The Initiative is geared to build on the strength of the Region's workforce. In general, clean-tech and other green jobs do not require advanced education degrees, yet they pay 20 percent higher than the median wage in the U.S.²⁰

Creating a strong, vibrant workforce in the renewable energy and energy efficiency sectors will put the Southern Tier in a strong position to reduce greenhouse gas emissions in the long run. With a growing workforce that is able to respond to new developments in the clean energy sector, the Region can make progress toward reducing energy consumption and related greenhouse gas emissions and increase energy independence while generating jobs and advancement opportunities. According to the REDC, this Initiative, when fully deployed, is anticipated to train 1,000 workers in the Region.

▶ **What Can Be Done?**

This Initiative will likely be implemented as a partnership between the Region's institutions of higher education, particularly community colleges, and energy and clean tech industry. Traditional classroom, hybrid, laboratory



²⁰ See, for example, SFCED, "Green Jobs Paying Off with Greener Salaries," <http://www.sfcged.org/about-sfcged/press/20111/green-jobs-paying-off-with-greener-salaries>.

settings, and online instruction will evolve as new workforce training needs emerge, building long-term sustainability in the workforce and career ladders in the field.

Specific skills needed include wind farm construction and maintenance; maximizing energy efficiency of homes, businesses, and public buildings through improved weatherization and electricity-saving technologies; retrofitting of residential and commercial facilities and installing biomass heating systems; and expansion of research and manufacturing of existing and new energy technology products.

▶ **What are the Barriers to Taking This Action and How Will They be Overcome?**

Currently, the proposed leaders of this Initiative in the Southern Tier have limited experience working together. Overcoming this barrier will require establishing new relationships and coordination among the three community colleges, local workforce investment boards, and industry to support and enhance each other's efforts to maximize workforce development for a new energy future and to engage in shared marketing. Direct lines of communication between the colleges, workforce investment boards, existing firms, and energy industry start-ups will help align needs, skill sets, curriculum, and employment.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

The target associated with this action is to increase average wages in the Region from 86 percent in 2010 to 90 percent of the national average in 5 years and to 100 percent of the national average or higher in 20 years. This action will increase the supply of skilled workers in the Region, increase their wages, and attract employers seeking critical masses of workers with these skills. It will also support expansion of existing energy businesses and growth of entrepreneurial green business start-ups. It would help achieve other energy efficiency and renewable energy goals, such as reducing building energy use and GHG emissions, which are measured under other energy actions. The GHG reduction benefits cannot be quantified separately.

▶ **Recommended Next Steps**

The REDC identified a strategy for implementing the Energy Workforce Development Initiative. This will involve convening a newly created Energy Workforce Advisory Board (EWAB). The Energy Workforce Advisory Board will be charged with developing transformational strategies and an operational plan which meets the educational and training demand of the energy-related sector in the Southern Tier. The Advisory Board will establish ad hoc working groups to:

- Update energy workforce intelligence data for emerging energy industry jobs to align education and training opportunities with needed workforce skills and compile an inventory of existing energy related, regional credit and non-credit education and training opportunities.
- Develop transformational strategies to provide comprehensive regional education and training opportunities resulting in a competitive workforce.
- Develop a comprehensive list of current public/private energy-related partnerships to avoid duplication and align regional efforts.
- Forge new public-private partnerships to leverage funding and create dynamic and responsive programs and services.
- Develop a regional coherent marketing strategy.
- Create a regional plan and review current workforce systems to measure effectiveness.
- Market this Initiative, enroll candidates into programs, and track success of matching students who have completed these programs with jobs in industry.

▶ **Who are Potential Leads and Key Partners for This Action?**

This Initiative was proposed by the REDC, which will provide key support. The project will draw on the education and training resources of Broome, Corning, and Tompkins Cortland Community Colleges. The colleges will work collaboratively and creatively to deliver education and training using multiple modes of instruction. They will

also partner with regional businesses, industry, workforce development agencies, BOCES, Cornell Cooperative Extension, building trades, and service organizations.

▶ **How Would Funding be Used?**

The REDC estimates it will cost \$4 million over five years to build on existing curriculum at the community colleges, and provide tuition subsidies, marketing, new laboratory equipment, and course delivery by qualified instructors. Potential sources of funding include: investment by energy companies in training in the form of tuition, program development funds, and contribution of equipment; NYSERDA's efforts in working with SUNY institutions to become Energy Smart Learning Centers; grant programs such as Federal Perkins IV Funding, which provides energy-related training and education; and several existing programs offered by the Region's community colleges.

▶ **Examples and Potential Projects**

The Puget Sound Regional Council in the greater Seattle region created an Energy Efficiency Initiative as part of an updated regional economic strategy. The Building Efficiency Testing and Integration Center will be a place for innovators in the energy-efficiency field to test their products, designs and services prior to launching them into the marketplace, to help them grow the energy efficiency industry in the region. The strategy includes a university-business partnership to develop a regional workforce with a focus on clean energy and energy-efficiency projects, similar to one that the Southern Tier's Energy Workforce Development Initiative hopes to create.

Identify, train, and certify contractors to meet increased demand for energy efficiency (*Action 29*)

Estimated GHG Reductions: Not possible to quantify

▶ **Why Take This Action?**

Ensuring the availability of energy auditors and contractors with the appropriate level of expertise to effectively weatherize existing buildings and construct new energy-efficient structures is critical to reducing overall building energy consumption in the Southern Tier. Residential, commercial, and industrial buildings accounted for 46 percent of all Southern Tier emissions (4.6 MMTCO₂e), and 60 percent of regional energy consumption (79,000,000 MMBTUs) for heating, lighting, processes, and other uses in 2010. Thus, reducing building energy consumption will play a large role in achieving New York State's 2050 target of reducing GHG emissions by 80 percent. Furthermore, weatherization of buildings reduces energy costs by an average of 25 percent.²¹ This initiative will prepare the Region's contractors to meet the growing demand for energy efficiency retrofits. Energy auditors and contractors need the proper experience and training to perform energy audits and ratings, weatherization, insulation, and energy efficient construction services. There are two nationally-recognized home performance certification organizations: the Building Performance Institute (BPI) and the Residential Energy Services Network (RESNET). In order for home and business owners to take advantage of financial incentives for energy work offered by the state, they must hire certified contractors.



With enough qualified contractors to respond to consumer demand for energy efficiency retrofits, great strides can be made in retrofitting the existing building stock and constructing new energy efficient buildings. This

²¹ See, for example, Wald, Matthew, "Focus on Weatherization is Shift on Energy Costs," *The New York Times*, December 29, 2008, http://www.nytimes.com/2008/12/30/us/30weatherize.html?pagewanted=all&_r=0.

action will enable consumers to more readily hire certified contractors, assuring that the work is done by competent professionals and that their investments will produce predicted energy savings. The Region's workforce will also benefit through acquisition of more skills and higher wages. Jobs in green industries generally do not require high levels of formal education, yet pay 15 to 20 percent more than the median wage, and nearly 3½ times the minimum wage.²² Skills in these fields can attract high-tech manufacturing operations or other green job opportunities which require a highly trained workforce.

▶ **What Can Be Done?**

To implement this action, colleges, training centers, and local workforce investment boards in the Southern Tier can enhance their current level of collaboration to improve joint training and offer nationally-recognized trainings for more workers in the most cost-effective way. Facilitating discussions with contractors can identify barriers to training and certification and brainstorm ways to overcome those barriers.

▶ **What are the Barriers to Taking This Action and How Will They be Overcome?**

- Certification programs can be expensive and time consuming and there are a limited number of organizations that offer certification training.
- In a largely rural area such as the Southern Tier, it can be hard to offer a full range of training programs due to low population density and relatively low numbers of potential attendees.
- While earning certifications can bring contractors work on projects receiving State and Federal incentives, it also causes contractors to pass some of the certification costs on to consumers, thus raising prices for retrofit work.
- Finally, contractors who do take on incentive-based work are often called upon to assist consumers with paperwork, and complete paperwork themselves, which can be a significant burden to a small business operation.
- Working regionally to assess demand for specific training types, training organizations and employers can overcome this barrier and determine the most cost-effective delivery locations and scheduling to meet demand.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

This action would help reduce building energy use and achieve other energy efficiency and renewable energy goals, which are measured under other energy actions. The GHG reduction benefits cannot be quantified separately. This action also addresses the target to increase average wages in the Region to from 86 percent in 2010 to 90 percent of the national average in 5 years and to 100 percent of the national average or higher in 20 years. This action will also increase the supply of skilled workers in the Region, support expansion of small businesses, and attract employers seeking critical masses of workers with these skills.

▶ **Recommended Next Steps**

- Create an ad hoc working group of workforce development specialists, college and university administrators, energy contractors, and potential providers to identify needs and barriers and strategies to streamline and achieve efficiencies in training for energy efficiency jobs, including addressing the challenges of job retention and enhancing return on investment for training.
- Identify the supply of energy efficiency contractors and engage economic forecasters to estimate the current and future demand for additional workers with particular skills.

²² See, for example, Martin, Scott, "Green Jobs Pay Better as Clean-Tech Sector Booms," *USA Today*, July 13, 2011, http://usatoday30.usatoday.com/tech/news/2011-07-12-green-jobs-economy_n.htm.

- Review current job training programs to ensure skills taught are applicable to existing programs.
- Consider ways to help small businesses handle the large amounts of paperwork required to help customers acquire incentives at the state and federal level. This may include investigating creating a county or regional “energy application assistant” to shepherd consumers and contractors through various programs.

▶ **Who are Potential Leads and Key Partners for This Action?**

Organizations well-suited to undertake this action are local workforce investment boards, community colleges, and Cornell Cooperative Extension partners. Other key partners are energy contractors, energy workers, BPI and RESNET trainers, and customers of energy contractors.

▶ **How Would Funding be Used?**

Funding is needed for faculty and licensing fees for additional training programs, and to expand and market existing offerings. The cost of training programs can be significant, but training to enhance current employees’ skills can be cheaper than training new workers. For example, the Society for Human Resource Management estimates that replacing current workers can cost companies up to 60 percent of the employee’s annual salary.²³

▶ **Examples and Potential Projects**

- Broome Community College’s Center for Energy Efficiency and Building Sciences offers BPI certification trainings and has funding programs to assist colleges and training centers in purchasing and maintaining equipment needed to provide adequate and relevant training.
- NYSERDA has a workforce development and training program that could serve as a model upon which to build in order to deliver BPI and RESNET educational curricula to additional workers throughout the Region.

Support development of processing and distribution facilities (Food Hubs) for local and value-added products (Action 35)

Estimated GHG Reductions: Not possible to quantify

▶ **Why Take This Action?**

The Southern Tier Regional Economic Development Council Strategic Plan: 2011–2016 highlights opportunities to grow and diversify agriculture, including implementing new technology to extend the growing season, promoting regional products, creating value-added products, and supporting applications in the renewable energy industry. The plan states that agriculture holds great promise as an emerging growth sector, based on the amount and quality of available land, capacity to respond to demand for biomass, and the possibility for adopting technological changes to improve crops.



Expanding value-added agricultural products has the potential to greatly enhance the profitability of farms in the Southern Tier. Promoting local food markets and expanding agricultural infrastructure can provide greater access to locally and regionally grown agricultural products to residents within the Region and to nearby urban marketplaces, such as New York City and Rochester. Food hubs are aggregation and value-added production and distribution facilities that collaborate with local farms and producers to expand the markets for their products.

Food hubs create efficiencies in energy use and producer time by offering cost-effective value-added processes such as freezing, cutting, dehydrating, and packaging that extend shelf life and increase the profitability of local

²³ Society for Human Resource Management, “Retaining Talent,” 2008, available at: <http://www.shrm.org/about/foundation/research/documents/retaining%20talent-%20final.pdf>.

products. They also create infrastructure that facilitates the placement of local foods into regional and state-wide distribution. Establishing and supporting food hubs will bring stability to farmers' seasonal sales and enable local products, already popular in the Southern Tier, to reach tables in schools, institutions, restaurants, and stores. It will also support expansion of agricultural production, creation of local jobs, and enhancement of the financial and environmental sustainability of Southern Tier agriculture.

Other benefits of this action include increased opportunities for local producers to access larger markets and achieve cost efficiencies. Consumers in the Southern Tier will have additional venues and producers from which to purchase local foods. In addition, this action is anticipated to expand employment opportunities for workers with skills in construction, manufacturing, and agriculture in the Region.

▶ **What Can Be Done?**

The Cornell Cooperative Extension's guide to local products estimates that if each resident in Tompkins County alone spent 10 percent of their food dollars on local foods, it would generate over \$29 million in economic value for the County.²⁴ This scenario, if rolled out across the Region, would be estimated to generate well over \$150 million in economic value. Creating buy local campaigns and making local products available for all consumers is critical and can make a substantial impact. Clemson University's study of South Carolina's "locally grown" campaign found that it had an impact of \$88 million per year and added nearly 200 jobs to the state's economy; Iowa's Department of Agriculture found that \$59.4 million in sales and nearly 600 jobs were generated from farmers' market activities in that state.²⁵

▶ **What are the Barriers to Taking This Action and How Will They be Overcome?**

Today, common challenges for local and smaller-scale agricultural producers in the Southern Tier include processing their products in a cost-effective way, competing with industrial-scale producers, and accessing mainstream markets. This action seeks to overcome those challenges by transitioning from current business practices to greatly improve how products are brought to market in the Southern Tier. Overcoming this "status quo" barrier will require investment in facilities, marketing, production and enhanced logistics and coordination across hundreds of producers with a range of sizes and needs.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

Expanding value-added agricultural products and creating food hubs will help to increase cash receipts from farm sales in the Region from \$338 million in 2010 to \$417 million in 5 years and to \$497 million in 20 years. This will increase the share of fresh, local products as a proportion of all goods consumed in the region and provide additional economic value to the region's producers. It may also contribute to higher regional wages, although these are not quantifiable. While there are potential GHG benefits of increasing local food purchasing, estimating these benefits on a regional scale is extremely challenging.

▶ **Recommended Next Steps**

- Identify organizations in the Southern Tier already involved in the production and sale of locally-produced products
- Track and learn from regional models to develop a project framework for this action. For example, Challenge Industries is developing a food hub to help suppliers and purchasers build relationships. Document how this project is deployed, issues encountered, and success rate.
- Convene ad hoc focus groups to identify barriers to the creation of a regional food hub network.
- Work with economic development authorities and other groups to identify and obtain seed funding and other financing to construct and purchase equipment for food hubs; given recent declines in manufacturing, there may be opportunities to repurpose warehouses and other facilities not currently in use.

²⁴ See the 2012 Guide to Foods Produced in the Southern Tier & Finger Lakes, <http://ccext.net/2012-guide-to-local-foods.pdf>.

²⁵ The Atlantic, "Beyond Farmers Markets: Why Local Food Belongs on Grocery Shelves," September 6, 2012, <http://www.theatlantic.com/national/archive/2012/09/beyond-farmers-markets-why-local-food-belongs-on-grocery-shelves/262064/>.

▶ Who are Potential Leads and Key Partners for This Action?

Organizations that might lead this initiative include Cornell Cooperative Extension, Challenge Industries, farmers markets, and the Farm Bureau. Local farmers are obviously key partners in this action, along with the USDA, New York State Department of Agriculture and Markets (NYSDAM), regional food distributors, grocers, and food transporters. Purchasers for local institutions, schools, hospitals, and other large food consumers can help support an expanded local food distribution network.

▶ How Would Funding be Used?

This action calls for the construction of warehouses, and value-added production facilities across the Region to store, maintain, and process foods. This will require private capital expenditures. New distribution networks and transport systems to markets will likely require new investment, as well.

▶ Examples and Potential Projects

- Southern Tier residents have expressed significant interest in locally-produced products. The GreenStar Cooperative in Ithaca has over 7,500 member-owners and 170 employees, and annual sales of around \$15 million per year. Its affiliate, GreenStar Community Projects, works with groups such as local schools to promote regional food efficiency and equity.
- In addition, there are a variety of guides and publications from organizations such as the Cornell Cooperative Extension Agriculture Program, Farmshed 2.0, Ithacan, Local First Ithaca, Pride of New York, and National Organic Farmers Association that provide information about local producers, markets, and product availability.
- Challenge Industries is building a 25,000 SF warehouse, distribution, and production facility to anchor a growing food hub.
- Regional Access operates a website marketing and delivery network for local food products.

WORKING LANDS AND OPEN SPACE

Develop a regional program to promote sustainable forestry and wood products (*Action 37*)

Estimated GHG Reductions: 630,000 MTCO_{2e} Annually by 2032

▶ Why Take This Action?

The Southern Tier has a wealth of forest resources that can be used to develop local building materials, but they are underutilized. Most hardwoods in the Southern Tier are harvested and milled locally but are then shipped to China and other international destinations for their furniture making industries. Local forest products – both raw and value-added – suffer from a lack of strong local markets.

Developing a regional program to promote sustainable forestry and wood products will support the creation of a sustainable materials market. By conducting broader outreach and branding of locally grown and sustainably managed woods and wood products, additional revenue can be generated in the rural portions of the economy, benefitting rural landowners and farmers. Encouraging participation in sustainable forest certification programs is one way to promote sustainable management and production of forest resources. If either a certified or sustainably managed local wood product



market is developed, the number of jobs in this area will likely be expanded, though the extent of this impact is difficult to predict.

Forests have the added benefit of serving as significant carbon sinks, and the Southern Tier's forestlands offset some of the Region's greenhouse gas emissions by absorbing carbon from the atmosphere in a process known as carbon sequestration. Improving forest management techniques, including sustainable harvesting and regrowth, will result in greater carbon sequestration on forest lands. Nationally, forested lands offset approximately 15 percent of emissions, providing a critical link in the carbon removal cycle. Given the extensive forest resources in the Southern Tier, that percentage may be higher. Additional benefits of better management of forest lands include improving water quality, reducing erosion, and conserving forest blocks that support recreation and plant and animal species.

▶ **What Can Be Done?**

A new model program that could be replicated or expanded in the Region is Cornell Cooperative Extension's Local Building Materials Initiative, described below. Another resource for partnership is the Region's state forests, which are certified and may offer an opportunity to form partnerships with the State for joint certification. The Region could also develop education and outreach programs as well as a branding and marketing campaign for locally sourced and sustainably managed forest products. Such programs will help to build demand for sustainable products. Marketing could include a woodworkers trail, similar to the Region's successful wine and cheese trails. In this case, woodcraft studios, furniture manufacturers, and wood product shops that use local, sustainably harvested lumber would be promoted as a tourist attraction.

To truly build a market for FSC forest certification, it is important to identify FSC chain of custody candidates, such as lumber mills that are interested in becoming FSC certified. This will establish a new production standard in the Region and could result in brand marketing that will support increased value-added wood products across the Southern Tier.

▶ **What are the Barriers to Taking This Action and How Will They be Overcome?**

- Forest Stewardship Council certification of forests can be costly and there are no FSC-Certified lumber mills and no programs to market local certified wood products.
- Presently, there is no developed market in the Region that pays a premium for certified forest products. Without programs such as a marketing campaign to expand the product while simultaneously building demand, there is little incentive for landowners or mill owners to pursue FSC or comparable certification.
- Developing a woodworkers trail and expanded local materials marketing could begin to build greater demand for sustainable wood products, thus helping the Region overcome these barriers.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

This action will help to increase the number of acres of land that is either under the Agricultural Environmental Management Program or is Certified Managed Forestland from at least 240,000 acres in 2010 by 25,000 acres in 5 years and 100,000 acres in 20 years. Carbon sequestration benefits were calculated based on the region's share of all forests in the State (public and private). The state has estimated that treating under-stocked forest stands will reap annual sequestration benefits of 4.7 million MTCO₂e by 2032.²⁶ Since the region contains 13.4 percent of the state's forested land,²⁷ increased sequestration in the region can be estimated as 630,000 MTCO₂e, or 20 percent of the Plan's estimated GHG reduction benefits.

²⁶ "Climate Action Plan Interim Report." New York Climate Action Council (NYCAC), 2010. Available online at: <http://www.dec.ny.gov/energy/80930.html>.

²⁷ "Forest Inventory Data Online." U.S. Forest Service, 2012. Available online at: <http://apps.fs.fed.us/fido/>.

▶ Recommended Next Steps

- Identify barriers faced by private landowners and sawmills to obtaining FSC certification through interviews with local forest owners and sawmill operators and/or through facilitated discussions at gatherings such as those of the New York State Forest Owners Association.
- Solicit input from forest landowners regarding creating forest management plans that incorporate sustainable harvest and planting techniques, ideas for local branding and marketing of sustainably managed wood products, and suggested methods to reach and influence forest landowners throughout the Region.
- Undertake concerted outreach efforts to educate and inform forest landowners and provide them with model forest management plan language. Provide assistance to wood manufacturers and processors to help them obtain FSC certification or other methods to develop a green building materials supply chain.
- Build the market for such products through development of a woodworkers trail, accessing NYS or national markets for sustainable wood products or an expanded buy local initiative.

▶ Who are Potential Leads and Key Partners for This Action?

Organizations that are well suited to undertake this action are Cornell Cooperative Extension, regional agencies, and colleges and universities with robust forestry programs. Key partners include forest owners, sawmill operators, and lumber consumers, including furniture manufacturers, regional lumber sales operations, and craft wood products manufacturers.

▶ How Would Funding be Used?

Funding will be needed for staff to conduct outreach and develop marketing programs. Lumber mills and forest owners that seek sustainable certification will likely need to pay additional costs, but those costs should be offset by future revenues associated with sustainable wood and lumber sales if true market demand is established.

▶ Examples and Potential Projects

The Local Building Materials Initiative is sponsored by Cornell Cooperative Extension of Tompkins County and the Ithaca Green Building Alliance. The initiative is designed to promote the use of local lumber and other building materials, along with locally manufactured and sustainably produced materials to add value and efficiency to local projects. The program identifies resources within 100 miles of Ithaca. While this covers most of the Southern Tier for building materials and suppliers, the actual marketing is focused on Tompkins County. This could be expanded throughout the Southern Tier.

CLIMATE CHANGE ADAPTATION

Incorporate anticipated climate projections, impacts and proposed mitigation strategies into Hazard Mitigation Plan updates (*Action 44*)

Estimated GHG Reductions: 0 MTCO₂e Annually by 2032

▶ Why Take This Action?

ClimAID, a 2011 NYSERDA-commissioned report on anticipated climate projections for New York State, highlights the need for the Southern Tier to prepare for climate change related impacts, including heavy downpours and increased flooding, heat waves, summer droughts, and major changes to ecosystems and crops. Southern Tier counties and municipalities, many of which are prone to flooding, already have Hazard Mitigation Plans (HMPs) which consider natural



and manmade hazards that affect the Region. In order to be eligible for various Federal Emergency Management Agency (FEMA) mitigation funds, jurisdictions are required to develop and update plans every five years according to standards prescribed by FEMA. These updates provide an opportunity to consider the role climate change plays in relation to a community's hazards. Incorporating climate change into these plans is both prudent and an efficient use of resources. Including an analysis of historic disaster events and the likelihood that the climate will change in the future allows planners to anticipate potential disaster events and plan for their mitigation. Evaluating the community risk, and the range of potential measures to mitigate this risk, will allow municipalities to identify the most appropriate and efficient ways to reduce risk and allow them to proactively prepare projects to leverage funding opportunities as they arise. Including projects that reduce impacts from climate change into HMP updates allows those projects to be eligible for federal and state funding for disaster mitigation efforts.

The primary benefit of taking this action is to make communities less prone to flood impacts, resulting in monetary savings and a reduction in loss of human lives. Another benefit from taking this action is to increase awareness of elected officials, stakeholders, and the general public about potential local impacts of climate change, and increase support for activities which reduce GHG emissions and increase community resilience.

▶ **What Can Be Done?**

Communities that have a FEMA-approved Hazard Mitigation Plan can review and update the plan in light of anticipated climate change impacts and determine which of those impacts are of most concern. While this can be done at any time, it is most effective to incorporate climate change comprehensively into the plan during the required 5-year update.

▶ **What are the Barriers to Taking This Action and How Will They be Overcome?**

- It can be difficult to convince emergency service providers and municipal officials of the diverse impacts of climate change and its likely impacts on the frequency and severity of community hazards.
- This is exacerbated in the Southern Tier, where many municipalities have few full-time staff members and planners.
- While it is a challenge for each municipality to fully understand and analyze the range of impacts for each risk, working together with regional agencies, universities, and state agencies will make the analysis of risks, impacts, and mitigation strategies more cost-effective, and help to coordinate mitigation strategies.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

This action will directly increase the degree to which climate change and adaptation are discussed within required Hazard Mitigation Plans (HMPs) and the five-year updates to those plans. Specifically, attainment of this target will require inclusion of climate risks in the HMPs and associated strategies to reduce vulnerability to these risks, based on a tiering system. The process of updating HMPs can also help provide climate impact information and potential mitigation strategies for inclusion in other long-range plan updates for local and regional transportation, land use, housing, environmental, and economic development plans. This will, in turn, help the region prepare for climate-related impacts, and identify cost-effective mitigation strategies that can be incorporated into regular capital and maintenance projects. The GHG reduction benefits of this action cannot be quantified.

▶ **Recommended Next Steps**

- Encourage Tioga and Delaware Counties to share their 2012 Hazard Mitigation Plans with hazard planning staff and elected officials in other counties in the Region, and encourage Tompkins County to do the same when its plan is adopted in 2013. Fostering dialogue about lessons learned among municipal staff and officials will help staff prepare for how to include climate change in their plans during update cycles.
- Encourage staff and officials in the Region to review and utilize *ClimAID: the Integrated Assessment for Effective Climate Change Adaptation Strategies in New York State*. The report focuses exclusively on climate change impacts and adaptation strategies specific to the state, and is geared to assist local decision-makers in developing and adopting adaptation strategies. Other documents to consider reviewing include the

Climate Resilient Communities planning framework from ICLEI (an international association of local governments and their associations that have made a commitment to sustainable development) and the natural hazard mitigation planning framework from FEMA as guides to develop an Action Plan with long- and short-term steps.

- Facilitate discussions among key stakeholders in the identification and analysis of hazards based on regional climate data and projected impacts as a result of climate change.

▶ **Who are Potential Leads and Key Partners for This Action?**

Organizations well-suited to undertake this action are county, city, and town planners and emergency service planners. Key partners include regional planning agencies, watershed organizations, climate change scientists, local governments, schools, private organizations such as hospitals and the Red Cross, and state agencies such as the New York Division of Homeland Security and Emergency Services.

▶ **How Would Funding be Used?**

One advantage of this action is that hazard mitigation planning efforts are often partially funded by FEMA. The New York Division of Homeland Security and Emergency Services is encouraging, but not requiring, communities to include climate change projections in their planning efforts. This funding can support hiring professionals with expertise in climate change and hazard planning to prepare plan updates.

▶ **Examples and Potential Projects**

Like other plans, both the Tioga County Hazard Mitigation Plan 2012 Update and the Delaware County Hazard Mitigation Plan 2012 Update were developed to meet the federal Disaster Mitigation Act of 2000 and make the counties more disaster resistant. Tioga and Delaware Counties' plans have incorporated the projections from ClimAID to assess the role of climate change on the future probability of floods, severe storms, extreme heat, and drought.

WATER MANAGEMENT

Perform energy audits and install retrofits at major water and wastewater facilities (*Action 51*)

Estimated GHG Reductions: 7,000 MTCO₂e Annually by 2032

▶ **Why Take This Action?**

Water and wastewater treatment processes use large amounts of energy. Nationally, the energy used to treat water and wastewater can account for up to 35 percent of a municipality's energy budget.²⁸ According to the EPA, potential energy savings at these facilities of 15 to 30 percent are "readily achievable" and have payback periods of between a few months and a few years.²⁹ Targeting the least efficient plants and implementing energy efficiency retrofits reduces both energy consumed and greenhouse gases emitted. Given that these facilities are typically older and



²⁸ U.S. Environmental Protection Agency, "Energy Efficiency: On the Road to Net Zero Energy," <http://www.epa.gov/reg3wapd/infrastructure/EnergyEfficiency/>; Lampman, Gregory, Kathleen O'Connor and Amy Santos, "NYSERDA and Strategic Energy Management at Municipal Wastewater Treatment Facilities," <http://www.nywea.org/clearwaters/08-1-spring/04-NYSERDA.pdf>.

²⁹ U.S. Environmental Protection Agency, "Energy Efficiency for Water and Wastewater Utilities," <http://water.epa.gov/infrastructure/sustain/energyefficiency.cfm>.

require periodic improvements, communities can plan for those upgrades and significantly reduce their energy bills when improvements are made.

Beyond the reduction in energy use and associated cost savings, improving energy efficiency at water and wastewater treatment facilities reduces the accumulation of solid waste, decreases use of chemicals, extends the life of equipment, and offers better system control. New York facility operators currently have access to several NYSERDA programs that support audits and retrofits at these types of facilities. NYSERDA has programs that provide 50 percent cost shares on audits, as well as programs to offset the cost of installing improvements. Hiring local energy professionals for audits and retrofits (supported by multiple actions) may create 14 jobs annually, averaged over the lifetime of the project.

▶ **What Can Be Done?**

Opportunities for reducing energy use in water and wastewater facilities include sealing building exterior areas to reduce energy losses, upgrading lighting, replacing equipment, incorporating renewables, and improving operations. Two specific processes that lend themselves to energy upgrades in water and wastewater facilities are aeration and pumping systems. Aeration is the procedure that introduces oxygen into treated water and is one of the most energy-intensive parts of water treatment processes. Installing control equipment that monitors dissolved oxygen and turns on the aeration pumps only as needed can reduce energy use significantly. Pumping systems also require a lot of energy. Upgrades can be made to the pumping system to minimize water distribution during peak times, improve the efficiency of the pumps, motors, and other processing equipment, and automatically regulate the pumping and other processes in a plant. Installing more efficient pumping systems and sensors can produce energy savings of 20 percent or more.

Most treatment plants have evaluation criteria that are used when purchasing new equipment and performing retrofits. Including energy efficiency and long-term operating costs of equipment in these criteria is critical to reducing energy costs over time. In order to identify the most energy-intensive processes at each plant, an energy audit by a trained professional is required.

These types of improvements are often best addressed through a performance contract with an energy contractor so that money saved as a result of energy improvements can be used to offset the cost of financing and installing those improvements. By definition, the future savings must be greater than the costs.

▶ **What are the Barriers to Taking This Action and How Will They be Overcome?**

- Use of decentralized water treatment systems throughout the Southern Tier poses a challenge for implementing expensive energy efficiency strategies and upgrades to treatment facilities.
- These barriers can be overcome through outreach and education to utility district boards and operators and strategic planning for upgrades over time.
- Additionally, these types of improvements lend themselves to implementation through performance contracting, with funding provided by the contractor (or bonded) and paid back directly from savings in energy costs. Performance contractors may require an initial payment for an energy audit and system design. A revolving loan fund, paid back through savings, could help system operators with these initial payments.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

This action will help to reduce on-site building natural gas and electricity consumption in the industrial sector. The Ithaca Wastewater Treatment Plant is reducing net energy use by 70 to 75 percent through a variety of investments in energy efficiency and renewable energy. If two-thirds of the region's water and wastewater treatment plants make similar upgrades, the region's emissions can be reduced by about 7,000 MTCO₂e, or 0.2 percent of the Plan's estimated GHG reduction benefits. There are about 320 community water systems serving about 478,000 people (though individual districts within the same system are often counted separately) and about 50 wastewater systems in the region. This action would affect about 210 of the water systems and 33 of the wastewater systems.

▶ Recommended Next Steps

- Raise awareness of the benefits of energy audits, retrofits, and performance contracting among municipal government officials and water and wastewater utility managers. This could be achieved through outreach, such as presenting at meetings, distributing educational materials, and partnering with performance contracting businesses in the Region.
- Once an entity has decided to move forward, the results of the energy audit will guide the next steps, as the audit should clearly identify which improvements are the most cost effective.
- After improvements are made, monitor energy usage in water and wastewater infrastructure to allow for continuous improvement.

▶ Who are Potential Leads and Key Partners for This Action?

Raising awareness on the issues related to water and wastewater treatment energy use could be undertaken by regional planning boards or councils of governments. Hiring energy auditors must be done by the operating agencies, often independent utility authorities or municipalities that control the facilities. Key partners are energy professionals, contractors, and businesses in the Region.

▶ How Would Funding be Used?

Funding will be needed to perform energy audits and to design and implement plant and equipment upgrades. If facility operators choose to use their own consultants to perform energy studies, NYSERDA currently has a program that will reimburse the municipality for up to 50 percent of the cost.

▶ Examples and Potential Projects

- The Ithaca Wastewater Treatment Plant recently announced it will reduce its net energy use by 70 to 75 percent through installation of multiple energy efficient plant and equipment upgrades. This is a joint effort being undertaken by the City and Town of Ithaca and the Town of Dryden and is being managed by Johnson Controls through a performance contract.
- Around the country, towns are already experiencing the benefits of upgrades. In Lowell, MA, the city's 32 MGD facility has already installed motion sensors for the lighting in the tunnels and buildings with an annual payback of \$20,000 per year, and recently installed energy efficient pump motors with annual savings of \$145,538. These upgrades have eliminated the need for a new water treatment facility.

WASTE MANAGEMENT

Expand Pay-As-You-Throw trash collection (*Action 56*)

Estimated GHG Reductions: 72,000 MTCO₂e Annually by 2032

▶ Why Take This Action?

Pay-as-you-throw (PAYT) programs charge residents for the collection of their household trash, based on the amount they throw away. This provides a strong incentive to reduce waste production and increases recycling and reuse of materials. PAYT advances the principal of the Four R's of Waste: reduce, reuse, recycle, and rebuy, and also encourages composting.

Traditional waste collection systems are paid for through fixed fees, regardless of a resident's level of usage. Pay-as-you-throw and other unit-based pricing systems require residents and businesses to purchase trash tags that cover the per-unit cost of



waste in order to dispose of it. In doing so, they ensure that consumers of waste collection services only pay for the collection of the waste they produce. Various studies have presented the immediate and direct benefits associated with this program, including findings that the recycling rates can increase by nearly 100 percent as a result of implementing a PAYT system³⁰. According to the EPA, PAYT can also reduce overall waste disposal by an average of 14 to 27 percent; various other studies have estimated a 30 to 40 percent reduction in the amount of waste deposited in landfills, directly reducing the environmental impacts and methane emissions from waste.³¹

PAYT systems also support expansion of recycling and reuse markets locally, which in turn grow the local economy. In recent years, municipal recycling has returned a profit to some solid waste managers that can be reinvested in solid waste outreach and education programs.

▶ **What Can Be Done?**

According to the EPA, at least 42 percent of all communities in New York State have PAYT or similar waste collection systems, including two counties and one city in the Southern Tier.³² Therefore, a significant amount of knowledge and on the ground program tracking is available for others in the Region to use to model PAYT programs. Also, many private firms that have experience implementing effective waste reduction programs, such as PAYT, can be contracted with to remove waste and achieve savings for customers.

▶ **What are the Barriers to Taking This Action and How Will They be Overcome?**

- Government action is needed in most cases to endorse the decision for municipal solid waste to switch to a PAYT system.
- This requires time and staff to prepare budget projections and operational changes, public notification and discussion, and implementation planning.
- It can be difficult to convince residents and businesses that are used to a fixed-fee system that PAYT is a beneficial alternative.
- An educational campaign for County and municipality boards can outline the fiscal and environmental benefits.

▶ **How Will This Help the Region Achieve its Sustainability Targets?**

The target associated with this action is to reduce per capita waste disposal rates from a 2010 level of 4 pounds per capita per day. Research from other areas has shown over 100 percent increases in recycling rates as a result of PAYT implementation. Combining this action with improvements to recycling infrastructure and implementation of materials reuse strategies will make the long-term target achievable as well. Using the EPA SMART BET tool,³³ it is estimated that implementing Pay As You Throw (PAYT) policies at the region's trash collection centers would reduce emissions by about 72,000 MTCO_{2e}, or 2.3 percent of the Plan's estimated GHG reduction benefits. This is based on conservative assumptions about policy design, and PAYT policies could be leveraged to realize greater reductions.

▶ **Recommended Next Steps**

- Organize a work session between operators who have implemented PAYT systems and representatives from other municipalities and solid waste companies interested in doing so.
- Hold public meetings to allow residents to learn about this program by introducing a PAYT system format, identifying its benefits, and obtaining buy-in from the public and other stakeholders.

³⁰ See, for example, Connecticut Department of Energy and Environmental Protection, "SMART Programs in Connecticut," <http://www.ct.gov/dep/cwp/view.asp?A=2714&Q=324920>.

³¹ See, for example, U.S. EPA, Pay-As-You-Throw: Lessons Learned about Unit Pricing, <http://www.epa.gov/osw/conserva/tools/payt/pdf/payasyou.pdf>.

³² U.S. EPA, 2006 PAYT Programs, <http://www.epa.gov/epawaste/conserva/tools/payt/states/06comm.htm#text>.

³³ Available online at: <http://www.epa.gov/osw/conserva/tools/payt/tools/smart-bet/>.

- Prior to implementation, ensure that the community's recycling and reuse facilities are prepared to handle the increased use of these facilities that is likely to result from wider implementation of PAYT systems.

▶ **Who are Potential Leads and Key Partners for This Action?**

The six counties in the Region that have not adopted PAYT programs and their solid waste divisions are the primary leads to implement this action. Key partners will likely be solid waste managers in the communities that have adopted PAYT, as well as government officials who make the decision on how to fund waste collection and disposal, private waste collection and disposal firms, and managers of recycling and reuse facilities.

▶ **How Would Funding be Used?**

Overall, there is a relatively low cost to implementing a PAYT system. When properly designed, PAYT fees will cover the costs of collection and disposal of waste.

▶ **Examples and Potential Projects**

- Tioga and Tompkins Counties and the City of Binghamton have already adopted PAYT or other unit-based pricing policies for waste collection and can serve as guides for other local governments aiming to implement PAYT. In addition, there is infrastructure in the Region to support the reuse and recycling of materials that often increases under PAYT.
- Finger Lakes ReUse and Habitat for Humanity's Re-Store facilities both focus on the reuse of construction and demolition materials, office supplies, housewares, and electronics. These facilities are community-oriented and their successes could be built upon by the development of a network of similar facilities throughout the Southern Tier.

DEVELOPING THE PLAN

The Value of a Sustainability Plan for the Southern Tier

The Southern Tier Region has magnificent natural features, productive farmlands, a capable and available workforce, and world-class universities and businesses. At the same time, the Region faces significant challenges in the areas of economic development, affordable living, land use, natural disasters, and natural resource protection. Since these issues relate to one another in complex ways, a comprehensive approach to sustainability planning is necessary. Individual communities, businesses, and families throughout the eight-county Southern Tier Region often do not have the resources to address each of the Plan’s nine topics in a coordinated way. A regional approach, where communities work together, learning from each other’s successes and failures, is more effective. By looking at all these issues simultaneously and understanding how they influence each other, we can find more cost-effective and long-lasting solutions.

**Cleaner Greener Southern Tier
Nine Topic Areas**

- Energy and Greenhouse Gas Emissions
- Transportation
- Land Use and Livable Communities
- Economic Development
- Working Lands and Open Space
- Climate Change and Adaptation
- Water
- Waste
- Governance

Understanding this need for a regional, integrated approach, community leaders came together to produce the Cleaner Greener Southern Tier Regional Sustainability Plan to revitalize the Region by creating a vibrant, resilient community that will support us, our children, and their children into the future.

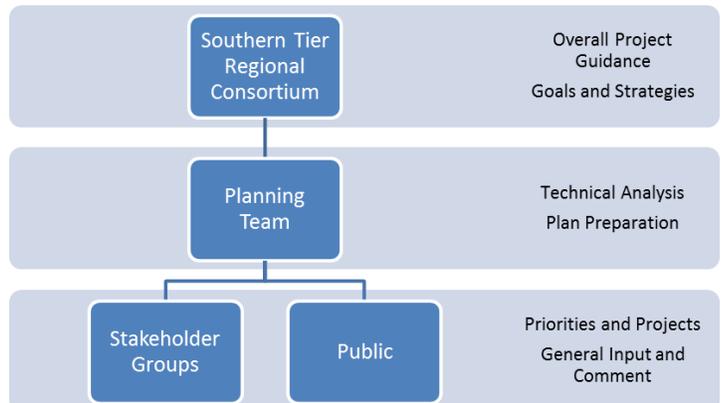
Listening to Community Voices

The immediate impetus for the preparation of this Plan was the availability of support from NYSERDA and the potential for additional funds during the project implementation phase to take action to help make the Plan a reality. The Region was already working together to address common problems including the loss of manufacturing jobs, chronic flooding, affordable housing, and protection of valued natural resources.



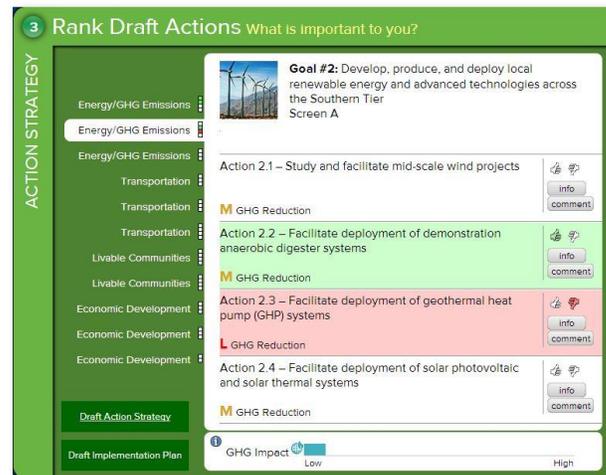
The Southern Tier Regional Consortium (Consortium) formed to guide the preparation of this Plan.

Consortium members included representatives of some of the organizations that would need to implement the Plan: county and city governments, regional and transportation planning agencies, the Regional Economic Development Council (REDC) and economic development agencies, universities and colleges, and cooperative extensions. The Consortium provided a variety of perspectives to identify the goals and strategies that were developed and provided input throughout the planning process. However, a truly community effort requires the broader and more diverse voices of the public.



Kickoff meetings were held in April 2012 throughout the Region to brainstorm the issues, gather input on vision and goals, and discover potential solutions to problems. Meetings held at this time included general public meetings, as well as stakeholder group discussions on the topics of the local economy, agriculture, transportation, land use and development, and energy and the environment. Stakeholder group participants included local elected officials, private sector employers, farmers and foresters, and public service providers. Evening meetings for the general public were held in Corning, Ithaca, Delhi, and the Town of Chenango.

Between April and October, the project's website (www.cleanergreenerstier.org) continued to inform and engage the public, allowing individuals to keep track of progress on the Plan, comment on draft documents, and help identify and select the strategic actions to be included in the Plan. The screenshot (at right) shows a web tool used to prioritize the actions. The website garnered great results, with 611 visits during the most active portion of the Plan's development.



In October 2012, a second extensive public outreach effort was conducted to present the draft implementation strategy. Once again, the outreach involved both public meetings and stakeholder groups. Stakeholder group meetings were held throughout the Region to discuss, refine, and prioritize a comprehensive set of actions that addressed the interrelated issues in the Plan: agriculture, community development, economic development, energy, housing, local food, open space, technology, transportation, universities and colleges, waste management, water and wastewater, and working lands. General public meetings were held in Corning, Chenango, and Ithaca.

Planning Process

Development of the Cleaner Greener Southern Tier Plan has relied on two key components – the robust public involvement process summarized above, and comprehensive technical analysis, research and synthesis. Both of these were integrated throughout the Plan's development and influenced one another; the public outreach helped shape and ground the research and technical analysis.

Technical Analysis

The technical analysis covers the research, compilation, synthesis, and analysis of baseline data and potential recommendations across all nine topic areas in the eight Southern Tier counties. This included analyzing all relevant existing plans and notable programs, compiling datasets including Geographical Information Systems, exploring relevant best practices and case studies, identifying sustainability indicators and targets, and tailoring this information and baseline assessment to the sustainability goals as they were being developed. It also included conducting a baseline GHG inventory, and analysis of potential GHG reduction benefits of relevant actions in the implementation strategy.



Linking to the Regional Economic Development Council Strategy

In 2011, the REDC of the Southern Tier completed a five-year Regional Economic Development Strategy to fund innovative economic development projects. The Cleaner Greener Southern Tier Plan covers the same eight-county Region as the REDC and expands upon the economic development and community revitalization focus of

the REDC strategy to include a broader set of sustainability issues. The REDC Strategy focused on economic development issues, but it also touched upon some of the other topics addressed in this Plan: energy and greenhouse gas emissions, livable communities, and working lands and open space. Whenever appropriate, recommendations of the REDC’s Strategy are incorporated into the regional sustainability plan and, in some cases, expanded upon. These linkages are noted in the Implementation Strategy.

TABLE 3 ■ Aligning the Southern Tier REDC with the Implementation Strategy Actions

REDC Strategy	REDC Action Item	Implementation Strategy Action
Strategy 1. The Southern Tier...New York’s Leader in Energy Efficiency and Renewable Energy Technology.	Southern Tier Renewable Energy and Efficiency Initiative: Residential and Small Scale Commercial Retrofit	1. Promote energy efficiency and renewable energy in residential and commercial buildings
	Southern Tier Renewable Energy and Efficiency Initiative: Large Scale Institutional and Commercial Projects.	1. Promote energy efficiency and renewable energy in residential and commercial buildings
	Energy Workforce Development Initiative	28. Implement the Energy Workforce Development Initiative 29. Identify, train, and certify contractors to meet increased demand for energy efficiency 32. Strengthen university-industry connections to improve and promote workforce development
Strategy 4. Revitalize the Rural Farm- and Forest-based Economy of the Southern Tier	Rural Initiative Venture Fund	35. Support development of processing and distribution facilities (Food Hubs) for local and value-added products 40. Encourage new farm startups and farm transfers to next generation
Strategy 5. Strengthen the Southern Tier’s Economic Development Backbone	Southern Tier Community Revitalization Project	20. Provide gap financing for community revitalization projects

Coordinating with Other Plans

In addition to the public outreach efforts and review of the REDC Strategy, the development of the Regional Sustainability Plan included review of over 150 plans already adopted by local municipalities and counties, regional organizations, and State agencies. This Plan builds on recommendations from a variety of single-purpose and comprehensive plans developed at the municipal, county, regional, and state levels. In fact, the goals included in this Plan are derived from or have incorporated goals in existing plans across the Southern Tier Region.

Regional Sustainability Goals

The Cleaner Greener Southern Tier Plan was funded by NYSERDA’s Cleaner, Greener Communities Program which was established in order to help New York’s ten regions establish sustainability plans and adopt smart growth practices. The Program promotes integrated, sustainable solutions – from statewide investments to regional decision-making on land use, housing, transportation, infrastructure, energy, and environmental practices – to improve our quality of life. Towards that end, the Plan has established 18 sustainability goals across nine topic areas. The goal development process included excerpting hundreds of example goals from the various local plans reviewed, soliciting input from public meetings, compiling a draft list of 21 goals and garnering input from the public via the project website, and thorough discussion and refinement at the Southern Tier Consortium where the final 18 goals were adopted.

Energy and Greenhouse Gas Emissions

1. Reduce building energy use.
2. Develop, produce, and deploy local renewable energy sources and advanced technologies across the Southern Tier.

Transportation

3. Create a regional multi-modal transportation system that offers real transportation choice, reduced costs and impacts, and improved health.
4. Reduce fossil fuel consumption and GHG emissions from transportation by reducing vehicle miles traveled, increasing efficiency, improving system operations, and transitioning to less carbon intensive fuels and power sources.

Land Use and Livable Communities

5. Strengthen and revitalize existing cities, villages, and hamlets.
6. Support development of housing that is energy and location efficient and offers choices to reflect changing demographics.

Economic Development

7. Create and retain more good paying jobs by building on the Southern Tier's regional strengths, including advanced energy and transportation technologies, globally-competitive industry, and workforce development and technology transfer partnerships with educational institutions.
8. Support tourism industry development with coordinated marketing, preservation, and enhancement of historic, cultural, educational, and natural resources and events.
9. Support farming and related businesses to reinvigorate the rural economy, enhance residents' incomes and standards of living, and promote local food and agriculture.

Working Lands and Open Space

10. Promote best management of fields, forests, and farmland to keep working lands in production, protect natural resources, and increase carbon sequestration.
11. Preserve and connect natural resources, open spaces, and access to waterways, to protect regional environment, ecology, habitat and scenic areas, and support outdoor recreation.

Climate Adaptation

12. Identify and plan for the economic, environmental, and social impacts of climate change.
13. Minimize flood losses by preserving and enhancing floodplains and wetlands, and by limiting development in flood-prone areas.

Water Management

14. Efficiently manage and upgrade existing water, sewer, and other utility infrastructure to support compact development and reduce energy use.
15. Improve and protect water quality and quantity.

Waste Management

16. Promote innovative waste reduction and management strategies that reduce the amount of material disposed of at landfills.

Governance

17. Increase collaboration among regional agencies, institutions, and local governments.
18. Increase fiscal efficiency and effectiveness in local government through energy and waste reduction, coordinated investments, and integrated planning.



These sustainability goals formed the basis for the indicators and targets, utilizing the list of possible indicators provided by NYSERDA, as well as indicators developed by the Planning Team based on regional knowledge. The final indicators and targets were selected based on the degree to which they related to the sustainability goals and on the ease with which they could be tracked in the future, i.e., data availability and reliability, frequency of data publication, and simplicity of calculation.

A Focus on Action

While the Plan establishes a vision for the future and a number of goals, its core is the Implementation Strategy. This Strategy identifies 65 priority actions to be undertaken by public and private partners to help achieve the vision, and includes the Top 22 Actions that were picked from the 65 priority actions. The Implementation Strategy will require the work of untold individuals and organizations across the Region, including public and private sector, businesses and schools, institutions and nonprofits, and municipalities and counties.

The 18 goals formed the basis for identifying potential action items and then evaluating those items for inclusion in the Implementation Strategy. The identification of potential action items relied on the technical analysis and public outreach conducted for this plan, as well as the relevant strategies and proposals from existing plans in the Region, including the Southern Tier Regional Economic Development Council (REDC) Strategy. The actions selected were the most applicable policies, programs, and projects to help achieve the region's GHG reduction and other goals. Projects that were well-suited to the Southern Tier, particularly those that had already had some level of success in the Region, and have proven GHG reduction potential were proposed. For initial public and stakeholder review, a draft long-term implementation strategy (with 168 potential actions) and short-term action strategy (64 actions) were developed.

Once the action items were selected, the emission reductions resulting from the action were calculated. For the top actions, the emissions reductions are reported for each action. Also, the total emissions reductions were reported within each chapter for the actions identified in that chapter. Identifying the potential emissions reductions for the recommended actions was challenging. The challenges fall into a few categories:

- The quality of a GHG emission reduction estimate is a function of the level of detail available. Whenever possible, the analysis used existing, credible methods for quantifying reductions.
- Many of the actions work together to reduce emissions. For example, actions such as increasing density, improving public transit, and implementing car-sharing programs collectively reinforce each other, making it difficult to identify the benefits associated with any one specific action. When this was the case, actions have been grouped and a shared set of assumptions is utilized.
- Some of the largest factors driving future emissions are beyond the control of the Region. A Business-As-Usual approach was used holding key factors constant based on current laws and policies.
- Several actions are unquantifiable. In some cases, actions are included because they support GHG reductions from other actions. In other cases, the actions have no tangible GHG benefits or the potential outcomes are too uncertain to quantify benefits at this time. These cases are indicated in the text.

Coordinating with Other Plans

Similarly, accurately estimating job creation potential across a wide range of strategies and geographies is challenging. This Plan references several related initiatives from the REDC of the Southern Tier's five-year Regional Economic Development Strategy, which included overall jobs estimates. The REDC Strategy jobs analysis of elements that have been incorporated into this plan is based on a total investment, using \$4 million in funding to leverage \$1 billion in private investment, with the estimated creation of 4,000 jobs over five years. We believe that reflects the job creation that could result from aggressive implementation of this regional sustainability plan in the coming years.

The energy-related jobs assessments in this Plan are bottom-up, driven by specific measures and their resulting energy savings or generation, yielding an average of 531 jobs annually over the lifetime of the projects (or more

than 10,000 jobs over 20 years). The jobs estimates are based on the calculated energy savings developed as part of the GHG analysis. Job creation estimates for the energy efficiency measures and renewable energy measures (except solar PV) were calculated using an approach that employed job multipliers produced by Professor Kammen at the UC Berkeley Renewable and Appropriate Energy Laboratory (RAEL).³⁴ These multipliers estimate direct job creation for different technology types - energy efficiency, biomass, geothermal and wind – based on energy savings or generation. This technology-specific national job metric developed by Kammen was used to estimate the direct jobs created per gigawatt of energy savings or generation achieved by this plan. For solar PV, an estimate of 55 FTE jobs was extrapolated from the results of NYSERDA’s “New York Solar Study”, which found 2,540 direct solar PV jobs would be created for deploying 5,000 MW solar PV throughout New York by 2025.³⁵ Values were adjusted to include only region-appropriate job qualifications, which meant removing jobs associated with the manufacturing of parts. This methodology estimates direct average job creation in the Region over the lifetime of the project. As the actions identified in this plan are further developed for implementation, more accurate job creation estimates will be possible.

³⁴ Max Wei, Shana Patadia, Daniel M. Kammen. “Putting renewables and energy efficiency to work: How many jobs can the clean energy industry generate in the US?” Elsevier Energy Policy Journal, 2010. Available at http://rael.berkeley.edu/sites/default/files/WeiPatadiaKammen_CleanEnergyJobs_EPolicy2010_0.pdf

³⁵ New York State Energy Research & Development Authority. (2012) “New York Solar Study”. <http://www.nysesda.ny.gov/Publications/Program-Planning-Status-and-Evaluation-Reports/Solar-Study.aspx>

SOUTHERN TIER OVERVIEW

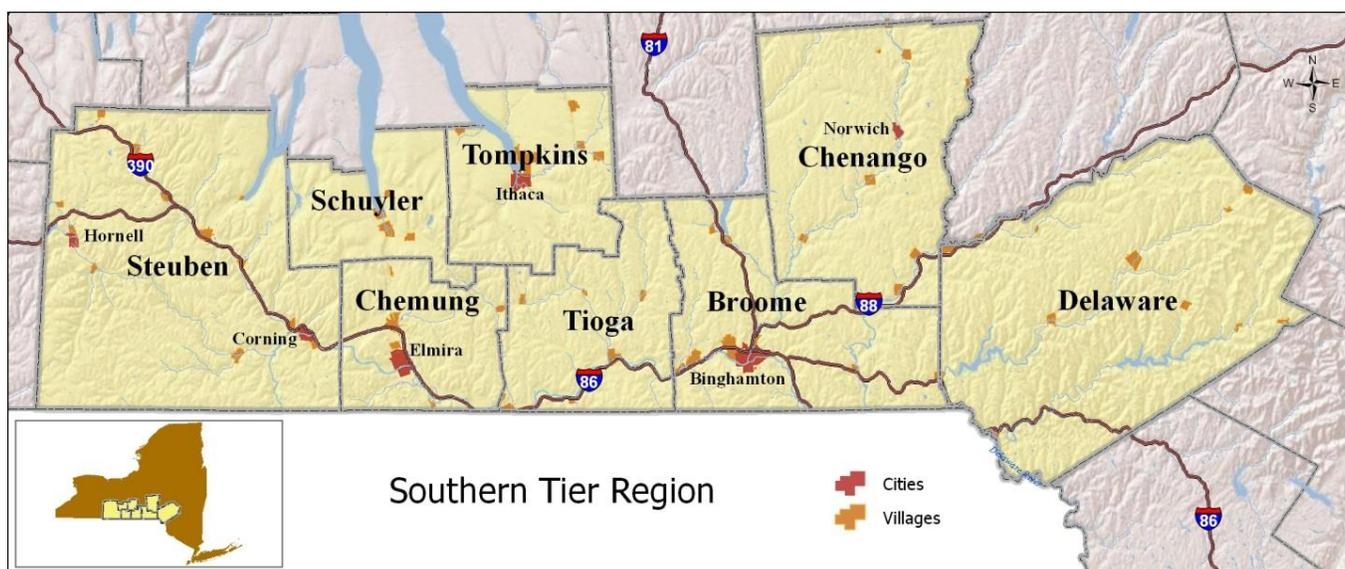
A New Region

The Cleaner Greener Southern Tier Plan is being developed to support regional sustainability priorities for an eight-county area in upstate New York State (NYS): Broome, Chemung, Chenango, Delaware, Schuyler, Steuben, Tioga, and Tompkins Counties. The Southern Tier is really three regions working as one with significant differences across the Region. The Southern Tier Central Regional Planning and Development Board (STC) in Corning provides services in the three western counties. The Southern Tier East Regional Planning Development Board (STE), based in Binghamton, encompasses the remaining five counties, but also includes other counties as members that are incorporated into other NYSERDA-designated sustainability planning areas. Tompkins County is geographically part of STE, but also has its own local council of governments providing a forum for inter-municipal cooperation and coordination. There are also three separate MPOs, responsible for transportation planning for the central urban areas of greater Binghamton, Elmira-Chemung County, and Ithaca-Tompkins County, which do not cover many of the rural counties.

The Region's boundaries are identical with those of the REDC. However, prior to 2011, when the REDC developed an economic development strategy, this particular combination of eight counties had not worked together. The Cleaner Greener Southern Tier planning process is forging new relationships, helping to craft a regional identity, acknowledging a great diversity of opinions, priorities, challenges, and assets. This task is particularly challenging as the Region contains nearly 200 local general-purpose governments, including six cities (Binghamton, Corning, Elmira, Hornell, Ithaca, and Norwich) and 59 villages, with no central urban hub for the entire Region.

Moving forward, the Southern Tier will need to contend with the fact that the Region's boundaries do not coincide with the regions as defined by other State agencies important to implementing this Plan. The Southern Tier will need to coordinate activities with three NYSDOT regions, three New York State Department of Environmental Conservation (NYSDEC) regions, and two New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP) regions.

FIGURE 4 ■ Southern Tier Region



The People

The 2010 Census showed a population of approximately 658,000 persons in the Southern Tier. This represents a decline in population of about 12,000 since 1990. The largest city is Binghamton, located in Broome County, with a population of just under 50,000 persons. Most of the Region's 6,260 square miles is rural in nature, with forested lands and agriculture accounting for over 90 percent of land mass and with over 60 percent of residents living in these rural areas. Only about 20 percent of the population lives in the Region's six small cities and another 18 percent live in its 59 villages.

The Southern Tier's population differs from the State and the nation. Most strikingly, the Region's population is much less diverse. Only ten percent of residents are members of minority groups, while more than one-third of the national and state populations are part of minority groups. Southern Tier residents also tend to be older than the national and State population. While the Region mirrors the national trend of an aging population, the Southern Tier is also losing its younger demographic to outmigration, creating concerns around the workforce, human service provision, and housing.

TABLE 4 ■ Selected Population Information

	So. Tier	NYS	USA
Total Population	658,056		
Population Density, persons per sq. mi.	106.8	411.2	87.4
Percent Minority Population	10.5%	40.8%	35.3%
Median Age	38.2 years	37.7 years	36.9 years
Percent of Population 25 Years Plus with College Degree or better	25.4%	32.1%	27.9%
Total Households	263,211		
Percent Households: Married couples with children	18.0%	19.8%	21.1%

2010 ACS 5-year averages

Significant numbers of the Region's 263,000 households pay in excess of 30 percent of their income on housing costs, even though the proportion is less than in New York and the nation as a whole. The housing stock is also more stable with a larger proportion of owner-occupied units and a larger proportion of households living in the same unit for over 10 years. However, compared with national averages, the Region's housing stock is much older, with roughly two-thirds of all housing built before 1970 and one-third before 1940. Such housing is less likely to have been built to modern energy efficiency standards, and, considering the Region's aging population, this older housing stock presents maintenance and upgrade challenges to ensure safe and healthy living conditions.

TABLE 5 ■ Selected Housing Information

	Region	NYS	US
Total Housing Units	305,700		
Percent Built 1939 or earlier	35.0%	34.0%	14.1%
Percent Built 1969 or earlier	63.4%	71.0%	42.6%
Owner-occupied units	69.0%	55.2%	66.6%
Moved into housing before 2000	50.1%	49.4%	42.1%
Percent units paying >30% of income for housing			
Owner-occupied units with a mortgage	27.1%	41.3%	37.6%
Owner-occupied units without a mortgage	15.7%	22.5%	15.6%
Renter-occupied units	49.8%	51.6%	50.8%

2010 ACS 5-year averages

Future Population Change

Population projections anticipate a declining population for the eight-county Southern Tier Region. These projections use the 2010 Census results as a starting point. The results are somewhat preliminary, as the assumptions are still based on rates estimated using data from around 2000. Nonetheless, even after being updated, the projections are expected to continue to reflect a shrinking population.

Jobs and Businesses

Regional economic challenges are very similar to the issues faced by all of upstate New York. While the loss of manufacturing employment in the 1960's and 1970's eroded the foundation of the Region's economy, the Southern Tier's manufacturing base is stronger than in many other upstate New York regions. Health care and education have since become major sectors of the economy. The area's resources, a capable and available workforce, world-class universities and businesses, magnificent natural features, and productive farmland, can help address these challenges.

Industry clusters in the Southern Tier include defense, distribution, insurance, agriculture, and manufacturing. Corning Inc., a Fortune 500 company, is headquartered in Steuben County, and several high-tech firms have a strong presence in the Region, including Lockheed Martin, IBM, BAE Systems, and Rockwell Collins.

Among the many prominent universities, colleges, and community colleges in the Southern Tier are the top-ranked Cornell University and Binghamton University. Both are major economic drivers in the Region. Binghamton University also has one of New York State's six Centers of Excellence, which support high technology ventures through a collaborative approach among the State, academia, private venture capital companies, and other private and public sector parties.

The Region has several challenges making it particularly vulnerable to economic downturns, including a declining population, an aging workforce, and an under-educated working-age population. A report prepared by the New York State Department of Labor (NYSDOL) analyzed "significant industries" in the Southern Tier. They were identified "on the basis of job counts, wage levels, job growth (both net and percent) over the 2006-2009 period, and expected job growth based on industry employment projections through 2016."³⁶

Eleven industries were identified as significant, five of which increased their employment levels between 2006 and 2009, a time of national economic downturn. With several industries in the manufacturing and health care sectors, the eleven identified industries are (ranked in order of total employment):

TABLE 7 ■ Significant Industries

Significant Industries	Employment, 2009
Educational services	46,700
Hospitals	12,900
Computer and electronic product manufacturing	12,300
Nursing and residential care facilities	12,100
Professional, scientific, and technical services	9,700
Ambulatory health care services	8,600
Specialty trade contractors	5,100
Transportation equipment manufacturing	4,600
Nonmetallic mineral product manufacturing	2,300
Management of companies and enterprises	1,900
Securities, commodity contracts, and other financial investments and related activities	600

Natural Systems

The Southern Tier covers an area of 6,260 square miles with a hilly terrain interspersed with relatively flat valleys along the rivers and streams traversing the Region. Three of New York's Finger Lakes are nestled along

TABLE 6 ■ Population Projections Through 2040

Year	Population
2010	657,909
2015	651,288
2020	643,719
2025	633,522
2030	619,973
2035	603,523
2040	585,624

Cornell Program on Applied Demographics

³⁶ Significant Industries: A Report to the Workforce Development System. Southern Tier 2011. New York State Department of Labor. <http://www.labor.ny.gov/stats/PDFs/Significant-Industries-Southern-Tier.pdf>

the northern border of the Region. Cayuga, Seneca, and Keuka Lakes are important sources of drinking water, marine habitat, and recreation as well as significant regional tourist destinations.

Working lands. Forests and farmlands dominate the Southern Tier landscape. Forests, comprising a majority of the Southern Tier, provide direct economic benefits from timber production and wildlife. They also support important ecosystem functions including carbon sequestration, water filtration, and stormwater run-off reduction. Agricultural lands account for roughly 30 percent of lands in private ownership. Animal husbandry, primarily dairying, is the largest agricultural production industry followed by significant crop cultivation.

These open lands serve other purposes as well; they provide important corridors and connections between forests and water sources for wildlife, separated from urban and suburban development, and may be particularly important as species distributions change in response to climate change and other environmental alterations.

FIGURE 5 ■ Land Cover

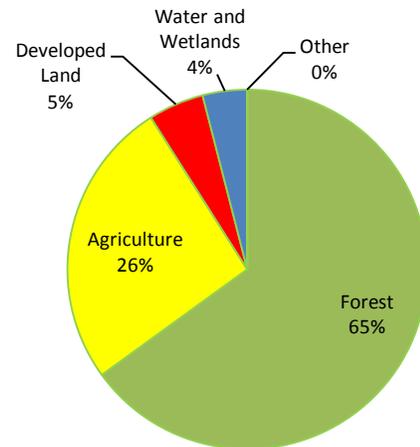
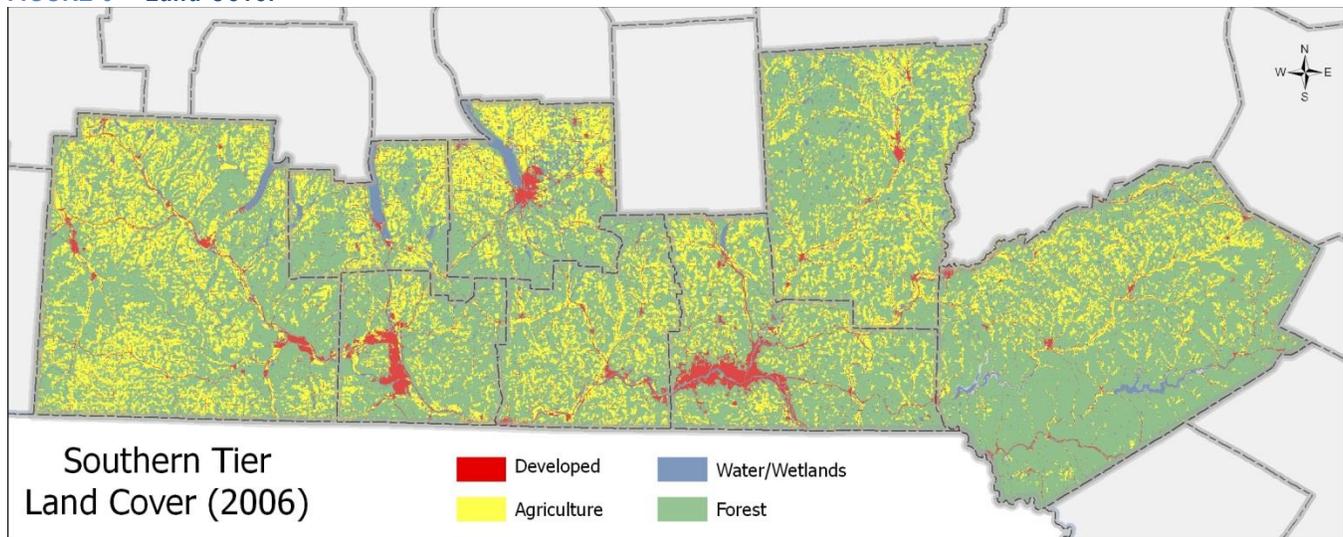


FIGURE 6 ■ Land Cover³⁷



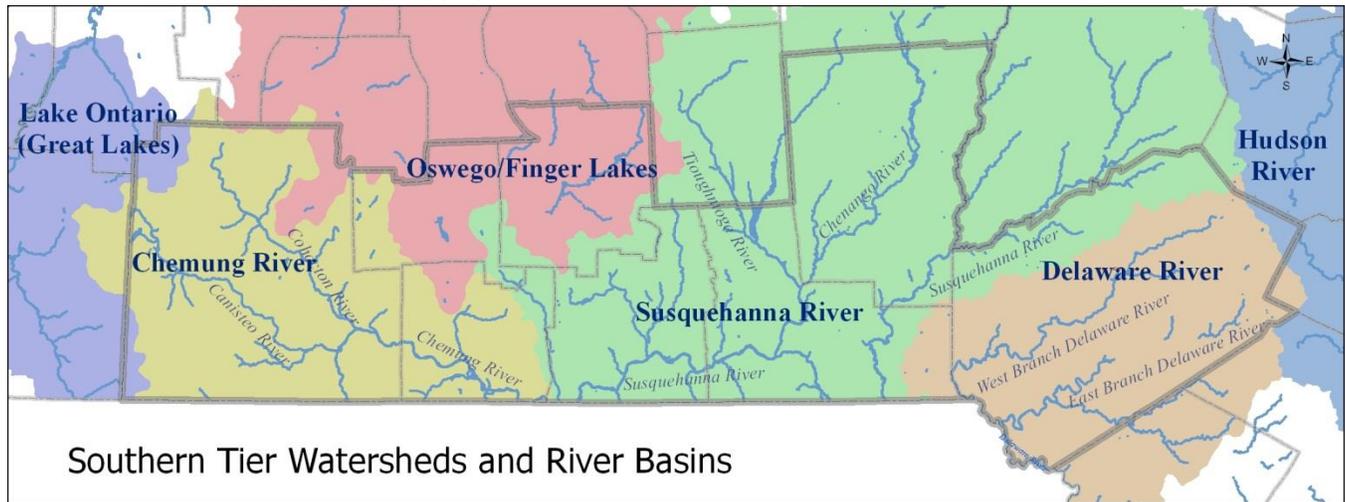
Water resources. The Southern Tier has an abundance of rivers and streams that continue to shape the landscape. The Region's rivers and lakes are vital components of the area's character and support the quality of life of its residents. Major rivers include the Chemung, Cohocton, and Canisteo, in the western portion of the Region, and the Susquehanna, Chenango, Delaware, and Tioughnioga in the eastern portion. Additionally, three of the Finger Lakes, Cayuga, Keuka, and Seneca, are located in the northwestern portion of the Region.

The vast majority of the Southern Tier is located within the Susquehanna River watershed eventually draining to the Chesapeake Bay. In 2010, the U.S. Environmental Protection Agency established the Chesapeake Bay Total Maximum Daily Load, a "pollution diet" with the intent of restoring clean water in the Chesapeake Bay and its tributary streams, creeks, and rivers. Portions of the Region are in the Oswego River/Finger Lakes watershed, primarily in Schuyler and Tompkins County, which flows northward to the Great Lakes; and in the Delaware River Watershed, primarily in Delaware County, which flows southward to the Delaware Bay, and is also a source for New York City drinking water.

³⁷ Developed lands shown on this map and the accompanying chart include lands classified as Developed using the NLCD 2001 Land Cover Class definitions.

Wetlands are found throughout the Region, although high-quality wetlands are particularly rare because historic and current land use practices have destroyed them outright or have introduced non-native invasive species. Where wetlands do exist they provide vital wildlife habitat and critical ecosystem services including flood attenuation, water filtration, and groundwater recharge. Perhaps the most important service wetlands perform for people in this flood prone Region is stormwater retention — these are the places where stormwater can spread out, slow down, and soak in. Aquifers are located throughout the Southern Tier. Primary aquifers, which are heavily utilized and are capable of yielding a great deal of groundwater, are located in four of the area’s counties: Broome, Chemung, Steuben, and Tioga.

FIGURE 7 ■ Watersheds and River Basins



Parks and trails. The Southern Tier is home to thirteen State Parks and innumerable local parks, providing a variety of outdoor recreation opportunities for residents and visitors. The Region has been increasingly focused on planning for and constructing multi-use trails. The Finger Lakes Trail is a part of a 950-mile system extending from the western NY/Pennsylvania Allegany County line to the Catskills in the east. In the Southern Tier, the Finger Lakes Trail links many local trails as it traverses seven of the Region’s counties and serves as a primary recreational resource.

FIGURE 8 ■ Parks and Open Space



2010 Energy and Greenhouse Gas Emissions Picture

In the 2010 GHG emissions inventory, total GHG emissions for the Southern Tier were estimated to be 9.9 million metric tons of carbon dioxide equivalent (MTCO₂e). This resulted from building and mobile energy consumption of 133 million MMBTU, as well as non-energy sources including waste, agriculture, and industrial processes. The Southern Tier's 2010 GHG emissions represented about 3.9 percent of the 2008 New York State total (the most recent year for which a complete GHG inventory is available), while the Region consumed about 4.9 percent of total state energy.

Energy usage in the Southern Tier is divided between stationary fuel combustion (42 percent), fuel use in transportation (40 percent), and indirect fuel use resulting from electricity consumption (18 percent). When combining stationary fuel combustion and electricity consumption, buildings account for 60 percent of all energy consumption. GHG emissions are generated primarily through the combustion of fossil fuels that releases both energy and carbon dioxide. Total consumption by sector is shown in TABLE 8 below, both with and without electricity consumption distributed by end use sector. Gasoline is the most common energy source in the Region, comprising 30 percent of energy consumption, followed by natural gas and electricity (27 percent and 18 percent, respectively). Other common fuels in the Region include diesel fuel, fuel oil, and wood.

TABLE 8 ■ Total 2010 Energy Consumption, by Source (MMBTU)

Source	Total Energy Use	Percent of Total	Total Energy Use (Electricity Included in Stationary Sector)	Percent of Total
Electricity Consumption	23,253,376	18%	--	--
Stationary Fuel Combustion	55,716,490	42%	78,969,867	60%
Residential	28,223,292	21%	37,281,021	28%
Commercial	13,977,642	11%	22,278,446	17%
Industrial	13,515,556	10%	19,410,400	15%
Transportation	53,748,023	40%	53,748,023	40%
On-road	47,224,916	36%	47,224,916	36%
Off-road	4,843,345	4%	4,843,345	4%
Marine	411,738	0%	788,169	1%
Rail	479,855	0%	479,855	0%
Air	788,169	1%	411,738	0%
Total	132,717,890	100%	132,717,890	100%

Energy use was the largest source of the Region's GHG emissions, accounting for 87 percent of total emissions. This total includes 46 percent of all emissions from buildings (31 percent from fuel use and 16 percent from electricity consumption), 37 percent of all emissions from transportation, and 4 percent from energy supply activities, including production, transmission, and distribution losses. This is comparable to the United States as a whole, where energy-related activities also account for 87 percent of all emissions. The primary difference is that in the Southern Tier, transportation accounts for 40 percent of all emissions, versus just 27 percent for the United States. This is a result of land use patterns and the relatively low level of industrial activity in the Region. With six small cities rather than one large central hub and a dispersed rural population, daily extended travel for work, commercial services, medical services, recreation and entertainment, and other amenities is a reality for most residents of the Region.

In addition to the energy-related emissions above, the Region's power plants generated over 2,500,000 MWh of electricity, resulting in GHG emissions of approximately 2.2 MMTCO₂e. While the inventory captures these data, these energy and emissions are counted separately from the Southern Tier total emissions baseline inventory, since emissions associated with electricity consumption are already included in the regional inventory.

Likewise, the GHG emissions inventory evaluates and quantifies the natural process of carbon sequestration that is occurring in forests, open land, and water in the Southern Tier, and it specifically evaluates changes in forest carbon stocks. While this category of analysis is not a required source in the NYS GHG protocol, it is included to

highlight the significance of the Region's large forest resource and to present an estimate of the GHG reduction benefits this resource provides. This is an evolving area of science and there is a great deal of uncertainty involved with these estimates. Therefore, the overall inventory results focus on gross emissions, and do not include the Region's substantial forest carbon sequestration resources. Nevertheless, due to the extent of forest in the Region, it will be important for the Southern Tier to consider carbon sequestration options for the Region's climate actions.

Although emissions from natural gas production is not a required source in the state protocol, it was included in the analysis due to the fact that the large majority of the New York State natural gas production currently occurs in the Region. About 58 percent of statewide production occurred in the Southern Tier Region in 2010, producing emissions of approximately 28,000 MTCO₂e from actual conventional, vertical drilling production.

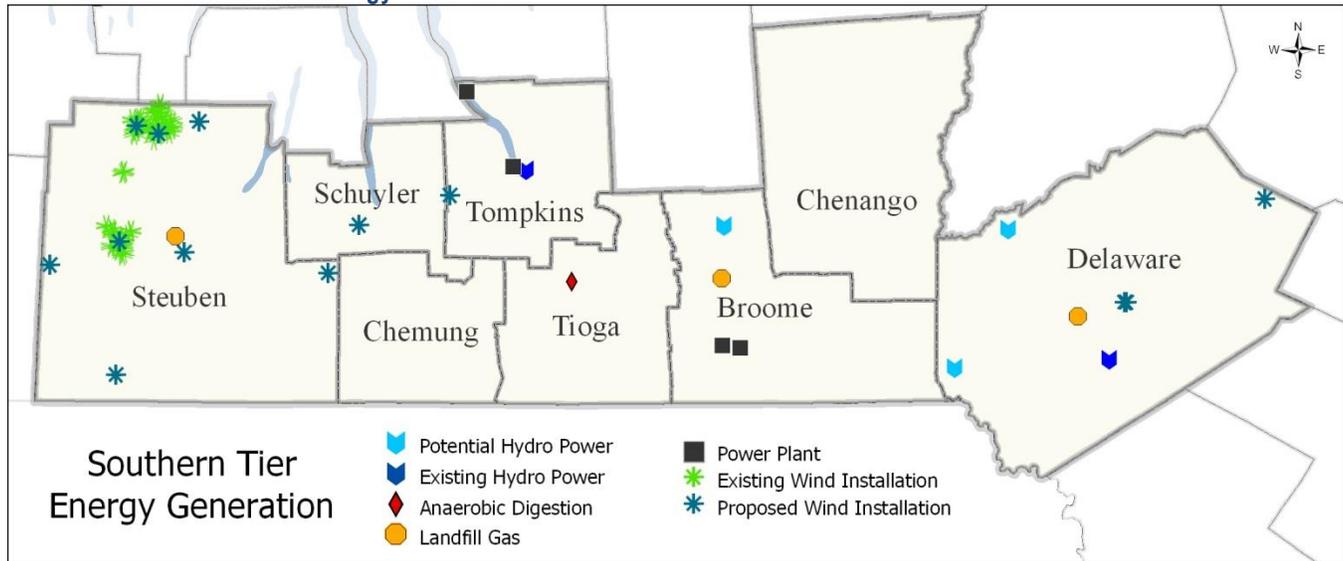
ENERGY AND GREENHOUSE GAS EMISSIONS

The thoughtful use of energy and the reduction of greenhouse gas (GHG) emissions are the underlying themes of this Plan. They run throughout this document and were central considerations when setting sustainability goals, establishing targets, and developing actions. In order to better understand the Region's energy and emissions picture, a comprehensive, region-wide GHG emissions inventory was performed for the baseline year of 2010. The entire inventory can be found in the appendices, but key highlights are included in this chapter to provide a framework for action and to help the Southern Tier community evaluate and understand how strategic investments will generate the greatest energy savings and reductions in emissions.

Energy is used in most aspects of everyday living. This chapter focuses on energy use in homes, businesses, institutions, commercial buildings, and industries. In the Southern Tier, 35 percent of the existing housing stock was built prior to 1940, typically with little or no insulation, single-pane windows, and aging heating systems. It will be a significant challenge to retrofit these homes to reduce heating and cooling costs. Improving the energy efficiency of buildings saves money, lowers housing costs for families, reduces emissions, and creates jobs, especially for local businesses. The chapter identifies opportunities and implementation actions necessary to meet the regional goals for energy and GHG emissions:

1. **Reduce building energy use.**
2. **Develop, produce, and deploy local renewable energy sources and advanced technologies across the Southern Tier.**

FIGURE 9 ■ Southern Tier Energy Generation



Snapshot of the Region Today

Energy Use and Greenhouse Gas Emissions

Residents in the Southern Tier utilize many energy sources to power homes, businesses, industry, and vehicles. The primary sources of energy used in the Southern Tier, in descending order, are: gasoline, natural gas, electricity and diesel fuel. The overall profile of the Region's GHG emissions is similar to that of other communities in the United States, with buildings and transportation accounting for the vast majority of emissions. While energy use in residential, commercial, and industrial buildings comprises the largest percentage of the energy pie, at 47 percent, the transportation sector is the largest sector energy user and the largest source of GHG emissions, accounting for 40 percent of energy consumed in the Southern Tier and 37

percent of GHG emissions. Residential buildings are the next largest, since they require large amounts of energy for heating and lighting, particularly in colder months. These buildings account for 28 percent of energy used in the Southern Tier and 20 percent of GHG emissions. Commercial buildings follow as the third largest source, accounting for 17 percent of energy use and 14 percent of GHG emissions.

In 2010, the energy consumed in the Southern Tier totaled 133,000,000 MMBtu. GHG emissions in the Southern Tier totaled 9,900,000 metric tons of carbon dioxide equivalent (MTCO₂e), which includes non-energy sources such as agricultural, landfill, or industrial process emissions.³⁸

The Region’s energy consumption and related GHG emissions were significantly lower on a per capita basis than the rest of the country, at 15 MTCO₂e per person in the Southern Tier versus 22 MTCO₂e per person nation-wide. While that is a heartening figure, the difference likely has to do with the relatively small share of industrial energy consumption and related emissions, 13 percent in the Region versus 30 percent nationally.

Electricity that serves the Region is produced both locally and across the country and is fed into the U.S. Grid and funneled out according to pricing, demand, and electricity systems. At any time, therefore, the Region’s energy may be produced by any combination of local and extra-regional sources. The Region consumes a fairly balanced mix of grid electricity: the largest source is hydropower at 30.8 percent, closely followed by nuclear at 30.6 percent, and natural gas at 18.9 percent. Electricity generation within the Region, produced by two large power plants and local utilities, relies primarily (at 81 percent) on coal as a fuel source. A growing amount of wind generation from Steuben Wind constitutes most of the remaining local electricity generation. Electricity consumption in the Southern Tier in 2010 was 6,815,000 megawatt hours (MWh), meaning that the Region was a net importer of electricity, importing 63 percent of its needs.

FIGURE 10 ■ GHG Emissions by Sector in the Southern Tier, 2010

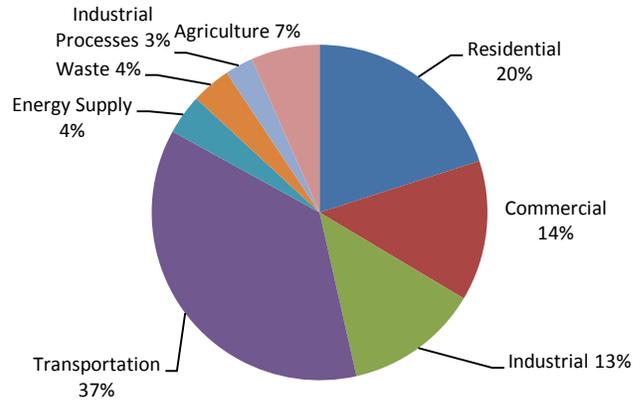
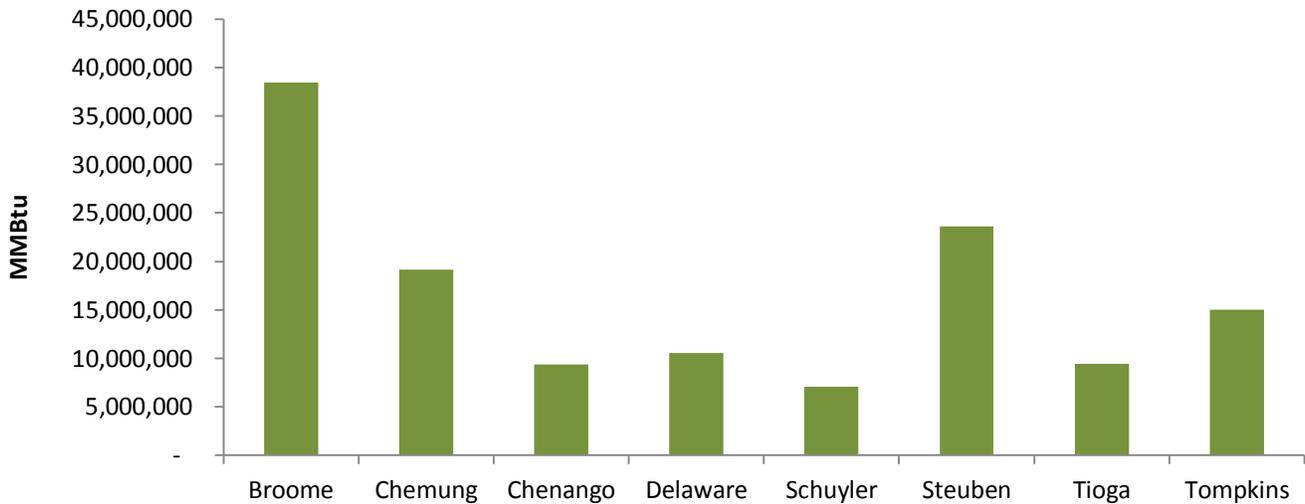


TABLE 9 ■ GHG Emissions and Energy Consumption by Sector in the Southern Tier, 2010

	GHG Emissions (MTCO ₂ e)	Energy Consumption (MMBtu)
Residential	1,974,078	37,281,021
Commercial	1,333,059	22,278,446
Industrial	1,271,887	19,410,400
Transportation	3,601,352	53,748,023
Energy Supply	380,243	-
Waste	372,982	-
Industrial Processes	268,581	-
Agriculture	651,389	-
Total	9,853,570	132,717,890

³⁸ One note about terminology is that “greenhouse gas” is the term used for gases that trap heat in the atmosphere, with the principal greenhouse gases that enter the atmosphere as a result of human activity being carbon dioxide, methane, and nitrous oxide. Metric tons of carbon dioxide equivalent, or MTCO₂e, is a measure of the combined ability of all emitted greenhouse gases to trap heat over a given lifetime in the atmosphere, relative to the effects of the same mass of carbon dioxide released over the same time period. Energy use is summarized in Million Metric British Thermal Units (MMBtu).

FIGURE 11 ■ Total 2010 Energy Use by County

Total consumption by fuel and by sector is shown in TABLE 10, as well as the relative prevalence of each fuel in the Region, New York State, and the United States. The Southern Tier trends pretty closely to the rest of the State, except for having lower relative consumption of fuel oil and higher relative consumption of wood.

TABLE 10 ■ 2010 Energy Consumption in the Southern Tier (Trillion Btu)

	Fuel Oil	Natural Gas	LPG	Electricity	Coal or Coke	Wood	Solar	Total
Residential	4.1	16.0	2.6	9.1	0.4	7.5	0.2	39.9
Commercial	2.4	10.5	0.7	8.3	0.0	0.4	0.0	22.3
Industrial	2.1	8.8	0.1	5.9	1.9	0.7	0.0	19.5
Total	8.6	35.3	3.4	23.3	2.4	8.6	0.2	81.7
Comparison of relative fuel consumption								
New York State	17%	46%	2%	29%	2%	4%	0%	100%
United States	17%	38%	7%	30%	4%	5%	0%	100%
Southern Tier	10%	43%	4%	28%	3%	10%	0%	100%

NOTE: This table does not include fuel used for electricity generation

Energy Efficiency

The Southern Tier and New York State have several programs in place to encourage energy efficiency in buildings. Programs sponsored by utilities, New York State, and local agencies provide residential, commercial, and industrial customers with financial incentives, technical support, and certification to encourage investments in energy efficiency. Many energy efficiency programs were developed in response to New York State regulations.

There is an increasing public awareness of, and support for, energy efficiency and sustainability initiatives in the Region. The Region's cold climate and severe winters provide an additional motivating factor for owners to weatherize and upgrade their buildings. Perhaps the most potent messages that spur residents and businesses to act are the motivators of increased comfort and long-term cost savings achieved by short-term investments in energy efficiency. Energy efficiency investments tend to be the most cost-effective investments with the shortest payback period.

While these incentives, programs, and motivations are all working to spur people to take action to improve the energy efficiency of homes and businesses in the Southern Tier, the barriers to action are the same in the Southern Tier as throughout the United States: lack of time, lack of money, and lack of understanding of how to get the work done. Strategies outlined in this Plan, such as the one-stop energy information and shopping initiative envisioned in the action to promote energy efficiency and renewable energy in residential and commercial buildings, will help the Region overcome these barriers.

Renewable Energy Use and Potential

Renewable energy sources can be derived from natural resources that are practically unlimited, like the sun or wind, or can be grown quickly and managed sustainably, like wood and other biomass. They can have a significant impact on lowering GHG emissions, creating local jobs, lowering the cost of heating and lighting, and reducing dependence on fossil fuels. Technologies that capture the Southern Tier's abundant natural renewable resources include wind turbines, solar electric photovoltaic (PV), solar thermal for hot water and heat, geothermal heat pumps, biogas from agricultural wastes, hydropower, and combined heat and power (CHP) systems. Several businesses in the Region are leaders in renewable technology development. For example, Lockheed Martin commercialized a distributed-generation biomass CHP solution, and Corning Incorporated applied its expertise in very thin and strong sheet glass to develop products that enhance the efficiency of solar PV panels. Corning is also developing new glasses that will enable lower energy usage for new LCD televisions.

Renewable energy resources provided approximately 11 percent of all the State's energy demand as of 2007, and could come close to 40 percent as early as the end of the decade.³⁹ In 2009, almost 16 percent of the State's electricity was produced by renewable sources, primarily conventional hydropower with small amounts of biomass, wind, and biogas. The NYS Renewable Portfolio Standard (RPS) has a goal of at least 30 percent renewable electricity by 2015, and the NYS Renewable Energy Roadmap recommends significantly increasing solar energy development and other renewables to help achieve GHG reduction goals.

The Southern Tier has already installed renewable energy sources. Solar PV electric is the most common with systems located in each county and numbering over 500. The three utility-scale wind farms in Steuben County account for the vast majority of renewable energy generated in the Region, with 460,000 MWh annual production.

TABLE 11 ■ Renewable Energy Installations 2012

	Number of Systems					Total Annual Generation (MWh)
	Solar PV Electric	Solar Thermal	Customer Sited Small Wind	Utility-size Wind	Anaerobic Digestion	
Broome	105	3	0	0	0	842
Chemung	28	0	4	0	0	172
Chenango	28	0	0	0	0	159
Delaware	43	2	0	0	0	341
Schuyler	15	1	0	0	0	130
Steuben	18	0	1	3	0	463,475
Tioga	36	4	1	0	1	3,675
Tompkins	253	23	0	0	0	2,284
Total Number of Systems	526	33	6	3	1	
Total Annual Generation (MWh)	4,177	113	24	463,316	3,447	471,077

Wind

Wind turbines are categorized by their size and electricity generation capacity. Typically, large-scale, also known as utility-scale, wind farms have turbines that produce one megawatt (MW) of energy or more; mid-scale or community-scale wind farms have turbines that produce at least 100 kilowatts (kW); and small-scale wind installations have turbines with capacity of less than 100 kW. Residential-scale wind turbines can be as small as a few kW.⁴⁰ Wind resources are categorized by class of wind power density. Under the National Renewable Energy Laboratory (NREL) classification system, the higher the class, the greater the wind speed. Utility-scale and mid-scale wind needs to be at least Class 3, or between 14.3 and 15.7 mph at 50 meters high.⁴¹

³⁹ NYS *Renewable Energy Assessment of the 2009 State Energy Plan*.

⁴⁰Adleman, Matt. "Transcript – What is the difference between large, community, and small scale wind energy." Illinois Wind Working Group, 2011. Available online:

<http://renewableenergy.illinoisstate.edu/wind/conferences/speaker%20presentations/2011%20Landowner%20Forum%20101%20Files/TranscriptMattDifferenceBetweenLargeCommunityAndSmallScale.pdf>

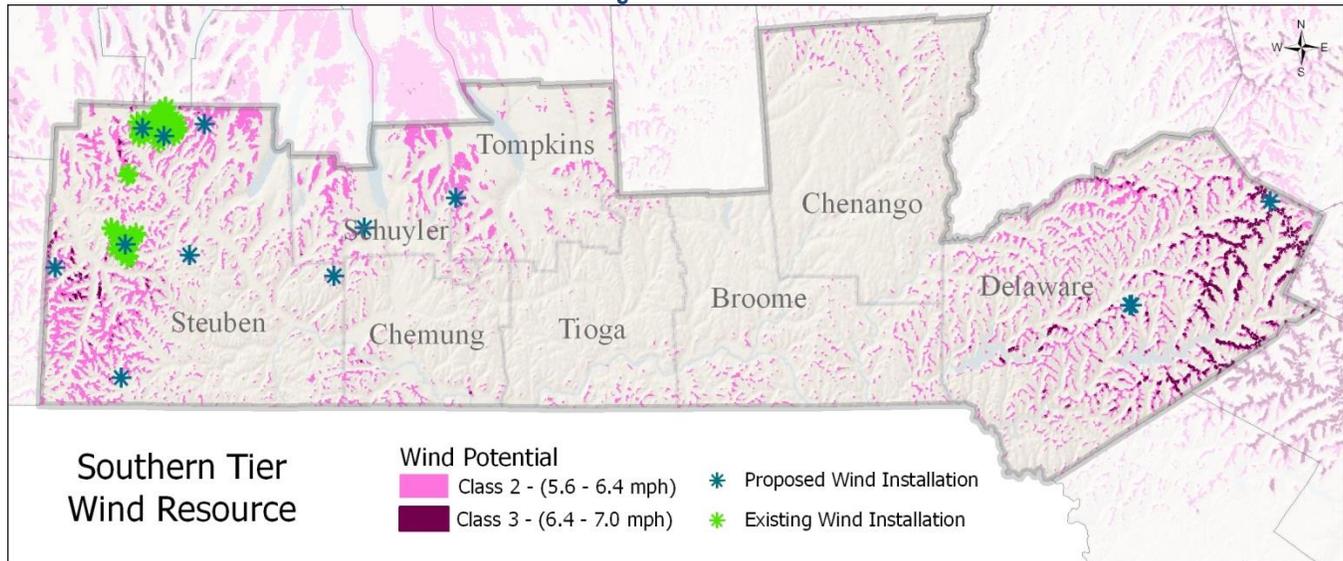
⁴¹ <http://rredc.nrel.gov>

Current Use in the Region: The Southern Tier has three large-scale wind farms, all in Steuben County, with a combined capacity of approximately 175 MW -- enough to provide for the electricity needs of nearly 58,000 houses.⁴² There is a 20 MW community wind farm proposed in Tompkins County called Black Oak Wind Farm. In addition, there are six small-scale wind turbines in Chemung County and one each in Steuben and Tioga Counties.⁴³

Potential for the Region: The potential for mid-scale wind in New York State is dependent on a number of variables, such as economic viability, turbine technology, wind resource, population, land features, and financial incentives for wind, including renewable energy certificates and the Federal Production Tax Credit (PTC). In New York State, many areas with wind resources of Class 3 and above are considered economically viable, especially since the Federal PTC was extended.

Class 3 wind resources can be found in Steuben and Delaware Counties (see FIGURE 12).⁴⁴ These two areas should be explored further to identify specific sites for either grid-connected or on-site mid-scale wind installations. Class 2 wind resources (12.5 mph to 14.3 mph) are more widespread. Because these wind maps are not sufficiently detailed to assess micro wind climates, there may be much greater potential for mid-scale wind resources than illustrated. A regional energy roadmap could refine this figure to show distinct wind power classes, electricity infrastructure, utility boundaries, and physical and/or population constraints.

FIGURE 12 ■ Southern Tier Wind Resources - Existing and Potential



Biomass

Biomass, biological material derived from living or recently living organisms, is a renewable energy source. Energy from biomass can come from plant matter burned to directly provide heating for a building or indirectly to generate electricity with steam turbines. Biomass can include forest residues, such as dead trees, branches and tree stumps; yard clippings; wood chips; and even some municipal solid waste. Biomass also includes plant or animal matter that can be converted into fibers or biofuels. Industrial-scale biomass can be grown from numerous types of plants, including miscanthus, switchgrass, hemp, corn, poplar, and willow. In many industrialized countries, biomass is commonly used as a source of thermal energy for residential and institutional heating and for certain industrial applications. The Southern Tier's expansive forest resources ensure that biomass is a readily-available renewable resource that should be examined carefully for its energy and job creation potential. As with any fuel source that is burned, biomass systems have the potential to impact

⁴² Gold Book

⁴³ "New York Renewable Portfolio Standard." New York State Energy Research and Development Authority, 2012. Available Online: <http://www.nysed.gov/en/Program-Planning/Renewable-Portfolio-Standard/-/media/Files/Publications/NYSERDA/2012-rps-report.ashx>

⁴⁴ See Appendix for wind map data sets

air quality. Biomass systems should be high-efficiency and low-emission systems in order to reduce their impact. The selection of biomass systems and fuels should take air quality impacts into consideration.

Current Use in the Region: In the residential sector, biomass is already widely used in the Region due to its widespread availability. An estimated 19,000 households (7 percent of the regional total) use wood as the primary household heating fuel. This compares with less than two percent statewide. On a BTU basis, wood trails only natural gas and electricity in terms of total usage. This is partly due to relatively low efficiency of wood used in conventional wood stoves (more households heat with fuel oil and propane, yet total consumption of those fuels is lower), and the fact that many households in the Region consume wood as a secondary or tertiary fuel, which is not reported.

Potential for the Region: The *New York Renewable Fuels Roadmap* evaluates the future of liquid biofuel production and feedstock supplies for transportation purposes in New York State. The *Roadmap* presents a snapshot of New York's current biomass production, including agricultural products and forest products.⁴⁵ The assessment concludes that New York possesses significant biomass feedstock resources, with approximate 1 million to 1.68 million acres of non-forest land that could be devoted to feedstock production. These feedstocks, if developed, could provide between 4.2 and 14.6 million dry tons of biomass annually. The Southern Tier offers medium to low potential for growing crops for biofuel feedstock production. In order to realize this potential, the *Roadmap* recommends a long-term program to provide cost-certainty to feedstock developers.

Biogas

Anaerobic digestion of animal manure produces biogas, which can be used to fuel an engine generator or turbine to generate electricity. Avoiding the open field decomposition of animal manure by digesting it and burning the resulting biogas can have significant environmental benefits, including a reduction in air and odor emissions, reduction in water pollution, and reduction in GHG emissions.

While any animal manure can be digested in an anaerobic digester, the actual biogas production depends on a number of factors ranging from the type of animal to the method of manure collection. The economic feasibility of a digester project depends on the biogas production rates, as well as capital and operating costs and the avoided costs of energy which the digester-generated power will displace. As a general rule-of-thumb, farms need to have more than 500 head of dairy cattle or 2,000 swine for an anaerobic digester to be technically and economically viable.⁴⁶

The *Tompkins County Community GHG Emissions Report, 1998-2008* notes that livestock populations have grown since 1998, as agriculture continues to be an important component of the local economy. With this increase, particularly in cattle, GHG emissions from the agricultural sector increased between 1998 and 2008. By 2008, the agricultural sector in Tompkins County emitted 4.6 million pounds of methane.

Several comprehensive plans in the Southern Tier address anaerobic digestion as a means for offsetting on-farm energy, reusing a waste product, and incorporating best management practices. The *Delaware County Agricultural Plan* notes the significant investment in livestock and the potential role for digesters. Delaware County is home to approximately 30,000 head of cattle, including dairy and beef cows and calves on 409 operations. There are a few larger dairy farms, which are well-suited for digesters. Farmers in a Delaware County survey strongly agreed about the need for alternative energy resources.

⁴⁵ "Renewable Fuels Roadmap and Sustainable Biomass Feedstock Supply for New York." New York State Energy Research and Development Authority, April 2010. Available online: http://www.nyserda.ny.gov/Publications/Research-and-Development/Biomass-Solar-Wind/~media/Files/Publications/Renewable%20Fuels%20Roadmap/report_10_05_Renewable%20Fuels%20Roadmap.ashx

⁴⁶ The AgSTAR report Market Opportunities for Biogas Recovery Systems and economic trade studies indicate that a farm owner should have greater than 500 head of dairy cows or more than 2,000 swine to make anaerobic digestion financially viable. From "The Viability of digesters in the dairy business." *Progressive Dairyman*. Available online: http://www.progressivedairy.com/index.php?option=com_content&view=article&id=4367:the-viability-of-digesters-in-the-dairy-business&catid=77:manure&Itemid=121

Current Use in the Region: There is currently one operating digester in the Region: the A.A. Dairy Farm in Candor managed by RCM International LLC. The 130 kW digester produces biogas and began operating in February 2010.

Potential for the Region: The Southern Tier has the potential for 31 digesters that would produce between 19,000 MWh and 70,000 MWh of electricity per year. Due to a lack of understanding of the technology, high upfront costs, and the lack of time and capacity for individual farmers to implement such an initiative, this practice has not yet been widely adopted in the Southern Tier. These barriers can be addressed with technical assistance and funding to implement pilot projects and disseminate results. However, even if it is assumed that only one-third or one-half of the possible number of digesters were actually constructed, this would still represent a potential for 6,300 – 23,200 MWh of energy production annually from a sustainable local resource. These digesters would also eliminate methane gases being emitted into the atmosphere, equivalent to over 150,000 MTCO₂e per year.⁴⁷ They would help sustain local agricultural development by lowering manure disposal costs and energy costs for farmers using anaerobic digestion on site.

Landfill Gas

Landfill gas (LFG) can be used as an energy resource because it contains methane, a natural gas which can be captured and used to fuel power plants, manufacturing facilities, vehicles, homes, and more. Methane is also a potent greenhouse gas so capturing landfill gas has the potential to reduce GHG emissions while also providing an alternative energy source. LFG is extracted from landfills using a series of wells and a blower/flare (or vacuum) system. This system collects the gas in a central point and then it is processed and treated for its intended application or flared. Landfills will need to be reviewed by technicians to determine the feasibility of tapping LFG. Most landfills that are not already outfitted with gas-capture systems are generally not good candidates for it.

Current Use in the Region: According to baseline data from the U.S. Energy Information Administration, there are three landfill gas plants in the Southern Tier Region, in Broome, Delaware, and Steuben Counties, that combined produce over 25,000 MWh of electricity per year.

Potential for the Region: In addition to the three active LFG plants, there are also two landfill gas plants in Chemung and Chenango Counties that flare but do not yet capture gas for energy. These currently do not have the potential to produce energy economically due to the low volumes of waste. In Chemung County, for example, it was determined that it would be necessary to increase the amount of waste deposited in the landfill to make gas-to-energy financially viable, so it was not pursued at this time. For this reason, limited additional opportunities for increased landfill gas-to-energy recovery exist in the Southern Tier.

Solar

Solar photovoltaics (PV) and solar thermal use a free and abundant fuel source, the sun, to produce energy for electricity and for heating and hot water. Solar PV electricity generation typically corresponds with peak demand times, thus having the added benefit of replacing the most expensive electricity. However, solar PV remains financially challenging because of the up-front system costs, including installation. NYSERDA offers incentives for solar PV to defray some of the cost. The USDA, through its Rural Energy for America Program (REAP), offers incentives for farm-based systems. In addition, a Federal 30 percent Investment Tax Credit (ITC) is in place until 2016. An exciting development in recent years is the growth of third party solar leasing companies that offer programs allowing the customer to pay for solar over time with low or no up-front costs.

Solar thermal systems collect heat from the sun and then transfer that heat to water for domestic use or to reduce the heating load of the home or business. Because the conversion efficiency of solar energy is significantly higher in building-mounted solar thermal systems (around 50 to 60 percent compared with solar PV's 15 percent), their total cost can be less than solar PV, noting that both technologies should be analyzed for a specific building retrofit application. These systems can be particularly cost effective in commercial operations

⁴⁷ For an analysis of the data and assumptions that support these projections see the Baseline Report in the Appendix.

using a large quantity of hot water, such as restaurants or lodging establishments, and can make economic sense when replacing oil or electric hot water heaters in residential or commercial applications.

Current Use in the Region: According to the NYSERDA PowerClerk tracking system, as of November 20, 2012, there were 526 customer-sited PV systems totaling 3971 kW in the Southern Tier, with approximately 20 percent in Broome County and 50 percent in Tompkins County. At 4 MW-DC, all the solar PV in the county is providing approximately 0.08 percent of the electricity needs. This Region has less than one percent of the total capacity of PV systems in the State.⁴⁸

Potential for the Region: There is strong potential for solar PV at the individual household, business, or farm level where the peak energy demand coincides with the peak energy solar production. For example, in Tompkins County there are 39,000 households, 2,000 commercial buildings, 232 industrial buildings, and nearly 1,000 school buildings which provide a substantial potential for rooftop solar installations. The desirability of any single location depends on multiple factors that make it suitable for hosting a PV system, including shading and the direction and tilt of the roof. Much of the Southern Tier does not have the critical population mass to readily attract private financing and the initial cost of solar installation is high. One promising method to overcome this barrier in the Southern Tier is by implementing solar aggregation programs. These programs address a number of market barriers: a contractor is able to provide systems for a reduced price because of reduced marketing and lead generation costs. Federal and state tax credits and state incentives are applied to their fullest extent, the complexity of reviewing technical specifications and multiple contractors is aggregated in a group effort, and low price and reduced effort helps customers to act more quickly, overcoming customer inertia. Additionally, while residential solar installations are generally allowed under zoning codes, they may face obstacles in some homeowner association covenants, and large commercial installations may face permitting issues. Additional education and outreach and updating zoning codes and homeowners association covenants would address these barriers.

A solar potential study was conducted for Tompkins County which demonstrated potential to provide approximately 20 percent of the electricity required by all commercial buildings by covering the roofs of the ten largest buildings in the county with solar PV. The study notes that calculating potential from residential buildings is much more difficult, as shading, roof shapes and tilts will affect the energy production.⁴⁹ An ambitious goal would be to increase solar capacity in the Region to 2 to 3 percent (102 - 153 MW-DC) of total electricity supply in 20 years. This is approximately equal to adding slightly more than current solar capacity every year for 20 years. It is worth noting that Germany, a world leader in solar, supplies only 6 percent of its electricity with solar PV, representing more solar than the rest of Europe combined, and has expended billions of dollars over the past decade. To achieve this ambitious goal, the Southern Tier could undertake a comprehensive solar resource study, taking into account both rooftop and utility-scale systems including such factors as: the number of buildings, open unshaded land, shading, interconnection and net metering constraints. A comprehensive study will ensure that solar is developed in the most economical and suitable locations. This goal also assumes that costs will continue to decline for solar and interconnection of intermittent technologies will be improved through technical advances.

New York State has identified solar as a critical renewable resource for deployment across the State. Decentralized renewable energy systems that can supplement and even offset peak summer energy use are going to be required to reduce the critical peak energy needs statewide. The Southern Tier's solar goal should be adjusted if necessary to be congruent with the overall strategic renewable energy goals of the state as they evolve.

Solar thermal water heating systems are well suited for residential, as well as commercial, use to supply hot water for cleaning, showering, and food preparation. These systems, implemented widely, could have an impact on lowering GHG emissions and energy costs, particularly where the system is replacing oil or electricity to heat water. Solar thermal systems can be less expensive and more efficient than solar PV systems and, combined

⁴⁸ NYSERDA (2012). NYSERDA PV Program PowerClerk. <http://nyserda.powerclerkreports.com>

⁴⁹ http://www.tompkins-co.org/planning/energyclimate/documents/SolarAndrew_FinalDraft_5-15-12.pdf

with current incentives, can have a faster payback. Incentives are available for this technology from New York State and the Federal ITC is applicable as well. Solar thermal systems face the same barriers as solar PV and the same strategies can be used to overcome those barriers. Indeed, many solar aggregation programs offer customers both solar PV and solar thermal systems.

Hydropower

Hydropower uses the energy provided by water moving from a higher elevation to a lower elevation to power machinery or make electricity.

Current Use in the Region: There are two operating hydroelectric dams in the Southern Tier. Cornell University's 1.9 MW hydroelectric facility was recently upgraded to increase annual production by 20 percent.

Potential for the Region: A study by the Oak Ridge National Laboratory provides an estimate of non-powered dams in the Southern Tier and their potential generation capacity.⁵⁰ Three usable, non-powered dams currently exist in the Region: Cannonsville Dam in Delaware County (16.4 MW); Rockbottom Dam in Broome County (3.5 MW); and Whitney Point Dam in Broome County (4.1 MW). The total potential capacity from retrofitting these three non-powered dams is 24 MW. Although re-powering these dams could face public controversy and would need to include a rigorous environmental impact analysis, given the significant amount of renewable energy production capacity, it should be explored, and is the reason it is included as an action item in this Plan. Current and potential hydropower sites are shown in the Southern Tier Energy Generation map at the beginning of this chapter.

A resource assessment by NYSERDA characterizes the additional potential for new small hydropower to be constructed in New York as low power (less than 1 MWa) or small hydro (between 1 and 30 MWa).⁵¹ Though data from this report are not available at the county level, according to the report, there is potential to increase power production from small hydropower development statewide by 50 percent. The suitability of developing a site in the Southern Tier will be based on meeting certain feasibility criteria: hydropower generation potential based on hydraulic head capture; flow rate; proximity to power plant, substation, and power lines; and distance from city limits and roads.⁵²

Geothermal

Geothermal energy is derived from the heat of the earth's interior that can be tapped to produce electricity or heat buildings. While New York does not have the geothermal resources to produce electricity economically, geothermal heat pump (GHP) systems are effective in almost all areas of the United States. GHPs utilize the constant temperature of the ground as a heat source or heat sink depending on the season.

Current Use in the Region: The Energy Information Agency State Data for NY shows a very small amount of geothermal being used in the residential sector, likely for geothermal heat pumps. Although its use in the residential sector is currently small, there has been an uptick in installations in the Region, as people try to reduce home and business heating costs. Taitem Engineering in Ithaca has developed a highly efficient air conditioning system that uses 60 percent less energy with geothermally cooled water as an input. Cornell's Lake Source Cooling project uses the deep cold waters of Cayuga Lake to cool Cornell's Ithaca campus and Ithaca High School. Cornell University is also actively researching an innovative deep rock geothermal technology, which has the potential to benefit the Region through pilot projects and potential spin-off technology businesses.

Potential for the Region: GHP heat exchange with the earth makes for very energy efficient HVAC systems, in some places providing over 70 percent of the energy required to heat and cool buildings. The capacity of a site

⁵⁰ DOE (2012) "An Assessment of Energy Potential at Non-Powered Dams in the United States (Final Report" April 2012. <http://nhaap.ornl.gov/content/non-powered-dam-potential>

⁵¹ "Energy Efficiency and Renewable Energy Resource Development Potential in New York State." New York State Energy Research and Development Authority, 2003. Report includes information about powering existing non-powered dams, assessment of relicensing existing hydropower plants, capacity expansion of existing dams, and construction of new dam sites.

⁵² DOE (2006) "Feasibility Assessment of the Water Energy Resources of the United States for New Low Power and Small Hydro Classes of Hydroelectric Plants" <http://www1.eere.energy.gov/water/pdfs/doewater-11263.pdf>

to host a geothermal system is based on the soil type and the space and depth required to install the piping necessary to exchange heat with the earth. With relatively low density of development in the Southern Tier, the area holds a large potential to deploy GHPs to drastically reduce heating and cooling system costs. A barrier to installation of GHPs will be the up-front cost. Affordable financing will be crucial to encourage the installation of these systems in new and retrofitted buildings.

Combined Heat and Power

Combined heat and power (CHP), or co-generation, is an innovative approach to increasing energy efficiency at existing electricity generating or steam/hot water facilities, particularly natural gas- and coal-fired power plants, wastewater treatment facilities, and large commercial and industrial sites that generate energy on site. In these facilities, the “waste” heat emitted from the combustion process is instead captured and supplied to consumers or, in the case of thermal facilities, used to generate electricity. The use of CHP increases the efficiency of such plants, up to 75 percent efficient compared to 56 percent for a facility with separate production of heat and power.

Current Use in the Region: There are 41 MW of existing CHP plants in the Region, located in Broome, Chemung, Schuyler, Tioga, and Tompkins Counties. The largest project by far is the 30 MW CHP plant at Cornell University, representing about 75 percent of the Region’s existing CHP capacity. There are five projects at public schools, two at industrial facilities, two at health care facilities, and a single example each in a government building, farm, and natural gas compressor station.

Potential for the Region: Combined heat and power can economically reduce the primary energy consumption and GHG impact of existing industrial, commercial, agricultural, and government facilities and serve the additional energy requirements of new economic development. CHP projects are both technically complex and have a high capital cost. Expanding CHP to the remaining centralized fossil fuel and thermal power plants has the potential to decrease the GHG intensity of these sources and reduce the GHG impact of on-site energy consumption for heating or electricity. Municipal buildings, schools, and health and education institutions are all potential candidates for CHP.

A barrier to widespread adoption of this technology is that there is not widespread understanding or knowledge of the CHP technology in the Southern Tier. Additionally, the systems can be expensive to purchase and install and require significant up-front expenditures. These barriers can be addressed through education of and marketing to private and public facilities and management staff and board members of school districts, institutions, local governments, and other entities responsible for aging physical plants. Grants or low-interest loans to help cover higher initial costs or feasibility studies could help overcome the cost barrier.

The large biomass potential in the Region can also support CHP. Successful biomass CHP heating projects have been done at large individual buildings, like schools, and to provide district heating, as recently done at Dartmouth College. There are 123 government facilities with 21.8 MW of potential CHP capacity in the Southern Tier and additional potential to serve commercial areas and hospitals. For example, the Cayuga Medical Center has conducted a feasibility study for installing a CHP system and is moving forward with a technical study.

Regional Energy and Climate Plans

A variety of plans and programs have been developed both statewide and within the Southern Tier to reduce GHG emissions from energy consumption, diversify energy generation, and increase building energy efficiency. Tompkins County municipalities and institutions are leaders in energy and emissions planning with the County, Ithaca College, Cornell University, the Town of Ithaca, and the City of Ithaca all having completed and adopted plans in the last five years. In 2011 the City of Binghamton adopted the *City of Binghamton Energy and Climate Action Plan*.

Issues and Opportunities

Numerous initiatives in the Region support energy independence, GHG emissions reduction, and development of a local energy efficiency and renewable technology economy. The Region has significant potential to capture

its abundant renewable energy resources, including solar, wind, biomass, and geothermal heat exchange, and employ renewable technologies such as district energy and combined heat and power. Implementing successful program models and designing incentives to encourage energy efficiency and clean energy, supported by a local culture that has embraced renewable and efficient energy, cutting-edge research at the Region's universities, and technological innovation at major regional industries, the Southern Tier is well-poised to move forward. Two primary challenges face the Region: the difficulty in encouraging individual action to reduce energy use even when it makes economic sense and the current low cost of natural gas.

Issues

Deep understanding of how choices and behavior directly affect energy usage and costs is not universal throughout the Region. This creates a barrier to widespread investment in energy efficiency. While the Region completed a significant number of energy efficiency retrofits to existing buildings in 2010, the bulk of those retrofits were performed in Tompkins and Broome Counties. In addition, financial barriers, including high initial up-front costs for some energy efficient measures; a plethora of complex programs and incentives at the Federal, State and local levels; and a dearth of certified contractors to perform the work, contribute to making it difficult for homeowners and business owners to take action.

Opportunities

While there are some real barriers to expanding energy efficiency programs and deploying renewables widely in the Southern Tier, there is also great potential to replace a significant portion of fossil fuel in the Region with a diverse portfolio of renewable energy resources. Each renewable resource has particular limitations and opportunities that must be considered and balanced against non-renewable energy sources: wind produces more power at night and in the fall and winter; solar is most productive mid-day and in summer and cannot be located in the shade; and biomass does not lower GHGs as much as wind or solar. Therefore, a portfolio of renewable resources will be needed to support the variety of energy needs of the Region while reducing GHG emissions. Specific opportunities around renewable energy include:

- A variety of natural resources for renewable energy development, including mid-scale wind; forests, brush, and crops for biomass; dairy farm waste-to-energy (anaerobic digestion); and existing non-powered dams.
- Existing wind installations in the Region that can be replicated, including 3 large scale wind farms in Steuben County, with additional projects proposed in Schuyler, Steuben, Delaware and Tompkins Counties.
- Extensive combined heat and power, which currently provides 41 MW of energy in the Region.
- Research at Binghamton University to develop new energy technologies, including the recent Smart Energy Initiative.
- Ithaca College and Cornell leading in developing and retrofitting buildings to LEED-certified standards that can serve as demonstration projects.
- Strong renewable energy incentive programs through NYSERDA and U.S. Department of Agriculture (USDA) Rural Energy for America Program (REAP).
- Low cost loans to support widespread deployment of renewable and advanced energy technologies and energy efficiency systems. The Southern Tier REDC Strategic Plan established a \$1 million revolving loan. There may be an opportunity to leverage private investment by 10:1 by using \$1 million in public funds as a loan loss reserve fund to guarantee a \$10 million revolving loan fund. Local community or regional banks or credit unions might also be interested in providing discounted green loans.

New York State is considered a national leader in implementing standards and programs to reduce its GHG emissions. Bold State initiatives, such as setting one of the most stringent renewable portfolio standards (RPS) in 2004, joining the Regional Greenhouse Gas Initiative in 2008, and adopting rigorous energy building codes will help the State, and thereby the Region, reach its emissions goals. In order to meet these aggressive statewide goals, it is anticipated the State will continue to lead the way with a combination of guidance, regulations, and funding opportunities to assist municipalities.

By adopting the State RPS, New York mandates that 29 percent of the state energy portfolio be generated by renewable energy resources by 2015; about 20 percent of this renewable generation already exists.⁵³ NYSERDA offers renewable energy incentives both through its RPS Main Tier programs and through customer sited incentives for wind, solar and other technologies helping to defray up-front costs and making systems more competitive with fossil fuel power. It is this funding which the Southern Tier will continue to use as it develops additional renewable energy resources. The State also has mandated an energy efficiency and conservation goal of reducing power demand 15 percent from forecasted levels by 2015. New York's Energy Efficiency Portfolio Standard funds are focused on acquiring energy efficiency savings and helping New York achieve its energy efficiency target. When fully funded, this program is expected to provide more than \$4 billion in benefits to customers, along with thousands of jobs.

The Southern Tier has already made significant progress in implementing successful programs and strategies at the local level. These programs provide a basis for, and proof of, regional willingness to embrace energy efficiency and renewable technologies. Replication of successful programs in both rural and urban areas is believed to be the most likely strategy to yield successful results, especially in the near term. Programs selected for replication were deemed to have significant ability to reduce GHG emissions, interest by agency partners and/or private businesses, and potential for positively impacting other aspects of sustainability, such as job creation and environmental protection.

Priority Actions identified for energy and greenhouse gas reduction were derived from successful programs including the following:

- **New York State's Capital Access Program** which has been expanded to \$19 million to provide matching funds to financial institutions for loan loss reserves as an incentive to increase small business lending.
- **The Finger Lakes Climate Fund**, administered by Sustainable Tompkins, as well as funds run by Cornell University and Ithaca College, offer consumers the option of purchasing voluntary carbon offsets. The Finger Lakes Climate Fund then uses those funds to implement local energy efficiency projects.
- **The Solarize Madison County** program has been very successful in creating an aggregated buying program to encourage adoption of small scale solar PV.
- **Broome County** is implementing a program similar to the Retrofit Program Marketing Model launched in Tompkins County, which has now achieved the highest retrofit rate in the state.
- **Chemung and Chenango Counties** have partnered with Tompkins County CCE to replicate the success of the Tompkins County Energy Conservation Corps.
- **Steuben County** has several successful large-scale wind farms in operation.
- **Tompkins County** has established a permanent exemption from local sales tax for solar installations.
- Many governments in the Southern Tier have performance contracts with private energy contractors to reduce energy use in government facilities and operations.
- **The Alternatives Federal Credit Union**, located in Tompkins County, has begun offering special discounts on loans for green home renovations, as well as solar panel installations and hybrid vehicle purchases.
- **Arnot Ogden Hospital** in Elmira has upgraded its boilers to run on woodchips. The cost analysis showed the wood gasifier was economically superior over time to the fossil-fuel alternative though the up-front cost was higher. The new boiler was installed via a ten year performance contract.⁵⁴
- **Cayuga Medical Center** undertook a combined heat and power feasibility study in the Fall of 2011 and is moving forward with a technical study to determine cost, energy saving potential, and whether district heating for structures near the medical center could be incorporated into the system.⁵⁵

⁵³ North Carolina State University. Database of State Incentives for Renewables and Efficiency (DSIRE). "New York Renewable Portfolio Standard". http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NY03R. Accessed March 25, 2013.

⁵⁴ <http://hpac.com/bse/finding-energy-savings-0609/>

- **The Danby Land Bank Cooperative** is providing an organization and infrastructure to allow rural landowners to utilize their fields and forests for wood and grass pellet production while providing the financial incentive of agricultural assessment for their land.
- **New England Wood Pellet LLC** in Delaware County is the largest biomass wood pellet manufacturing facility in the Northeastern U.S., and produces enough renewable energy pellets annually to heat 25,000 homes and businesses.

Southern Tier Examples

Photovoltaic Agreements – Tompkins County

Tompkins County has recently authorized a 15-year lease plan with Solar Liberty, a renewable energy installer, for the installation and maintenance of solar PV panel systems on seven county-owned buildings. Solar Liberty, based in Buffalo, NY, is the state's largest solar installer and distributor. They work with homeowners, businesses, schools and institutions, and local governments to engineer optimal systems and maximize the performance of the photovoltaic (PV) solar components.

The \$1 million project was funded through federal tax credits and NYSERDA incentives. Tompkins County will pay lease payments of \$14,000 annually which includes panel maintenance. It is estimated that the panels will pay for themselves each year, while netting an additional \$13,000 in annual energy savings. Over the next 15 years of the lease, it is projected that the solar panels will save Tompkins County \$195,000 in avoided energy costs.

The number of panels on each County building varies depending on the facility's energy use, size, location, and well-suited roof area. The County's Emergency Response Center hosts a 24-kilowatt (kW) system composed of about 116 panels, while the Public Works facility had a 50-kilowatt system installed on its roof. The entire county-wide solar photovoltaic panel system constitutes 235 kW, which supplies more than 10 percent of the electricity for the seven buildings participating in this project.

It is anticipated that these solar panels will demonstrate a cost-effective leasing strategy that may serve as a model for the installation of solar panels on other Southern Tier government buildings, homes, businesses, schools, and non-profit organizations. Local government officials have observed that the Solar Liberty project will save taxpayers money now, while lowering the County's future carbon footprint and help blaze a path toward inclusion of on-site renewable for electricity production.⁵⁶



Solar PV installation on Tompkins County Building C, Fall 2012.

⁵⁵ http://www.tompkins-co.org/planning/energyclimate/documents/EnergySupplyandDemand_fn_Final_5_24_12.pdf

⁵⁶ http://www.ithaca.com/news/article_1632df9c-2852-11e2-b521-0019bb2963f4.html and <http://www.solarliberty.com/>

Howard Wind Project – Steuben County

The Howard Wind Project began operations in Steuben County in 2011. Constructed primarily on farmland, its development began in 2004. This project required significant manpower to be completed; over 200 workers from the local labor pool were recruited to construct the project.

The Howard Wind project utilizes 25 Repower USA MM 92 turbines. The turbine towers stand at a height of 78.5 meters (258 feet), with the tallest point of blade reaching 408 feet above the ground. Each sweep of the blades covers nearly 70,000 square feet. The electric collection system includes about 35.8 miles of underground electric lines and $\frac{3}{4}$ mile of pole-hung lines above ground. Each turbine is capable of producing over 2 megawatts of power at full load.

In total, this wind project generates 51.25 MW of electricity at full load, which is enough to power over 35,000 households when wind is present. In contrast, a coal plant would have to burn 86 million tons of coal to produce the same amount of electricity. The Howard Wind Project and the two other installed industrial scale wind projects in Steuben County are the reason that the Southern Tier's energy production mix includes 10 percent wind-sourced electricity.



Current estimates show the Project generating \$85 million in payments over the 20-year life span of the project, split between the Town of Howard, Steuben County, and local schools. It costs approximately \$2 million annually to operate and maintain the project, with seven full-time employees and several part-time jobs for road maintenance, landscaping, and other tasks.

The Howard Wind Project is an inspiration for Southern Tier renewable energy potential. Wind energy projects can successfully operate in any place with open space, available land, access to a power grid, and strong wind. The Howard Wind Project produces none of the sulfur dioxide (acid rain), nitrogen oxide (smog), and mercury emissions that are commonly associated with fossil fuel energy generation. In addition, the amount of carbon dioxide emissions the Howard Wind Project has offset is equivalent to taking 19,000 cars off the road each year. The Project has been an invaluable asset to its rural community.⁵⁷

Strategy for the Future

Goals

1. **Reduce building energy use.**
2. **Develop, produce, and deploy local renewable energy sources and advanced technologies across the Southern Tier.**

These two goals were selected for Energy and GHG Emissions in recognition of the significant amount of older housing in the Southern Tier and the paramount need to retrofit those structures. In tandem with those retrofits, it was determined that it will be crucial to embrace the renewable resources that are abundant in the Region in order to significantly reduce GHG emissions from buildings.

Indicators and Targets

On-site building natural gas and electricity consumption and number of building retrofits were chosen as indicators as they will help to measure progress towards reducing building energy use. There is some question

⁵⁷ <http://www.everpower.com/projects-howard.shtml>

as to whether building energy use data will be available in the future and at present data across all NYSERDA energy efficiency programs are not publicly available. Tracking the capacity of NYSERDA-funded renewable energy installations will measure progress towards deploying renewable energy sources. At present, those data are not generally available but they may be made available in the future. The other indicators (regional energy consumption and CO₂e emitted per capita) will track general progress towards reducing energy use and GHG emissions in the Southern Tier. Since building energy usage is a large contributor to total amount of greenhouse gas emissions produced in the Southern Tier, an aggressive target for the reduction of natural gas and electricity consumption for buildings was established.

Eleven priority actions were identified through the planning process based on technical analysis, stakeholder support, feasibility, and greatest GHG reduction potential. Together they will help achieve the targets by improving the efficiency of the energy used in buildings and by switching to renewable and less GHG-emitting sources of energy. In order to quantify the expected GHG emissions reductions, assumptions were made about the anticipated implementation of each action over the next 20 years. By 2032, the Southern Tier can expect to reduce GHG emissions by 1,271,000 MTCO₂e by implementing these actions. This represents a 39 percent reduction in emissions from 2010 levels in the residential and commercial sector, and a 13 percent reduction in the overall GHG emissions for the Region. These reductions due to reduced energy use in existing homes and businesses are 1.3 percent of the reductions needed to meet the New York State emissions reduction target. All of these priority actions will need to be implemented to achieve these goals and targets over the Plan's 20-year timeline; other supporting actions can be found in the Supplemental Actions list in the Appendix.

INDICATORS

On-site building natural gas and electricity consumption per end use (residential, commercial, and industrial)

Baseline (2010)

58.6 trillion Btu total on-site building natural gas and electricity consumption

- Residential – 25.1 trillion Btu
- Commercial – 18.8 trillion Btu
- Industrial – 14.7 trillion Btu

Targets

- Long-Term (20 years): Reduce on-site building fuel and electricity consumption - 40% in residential & commercial sectors - 30% in the industrial sector
- Short-Term (5 years): Reduce on-site building fuel and electricity consumption - 10% in residential & commercial sectors - 7.5% in the industrial sector

Total number of building retrofits performed with NYSERDA funding

Baseline (2010)

75 assisted ENERGY STAR® retrofits. Data are not publicly available across all NYSERDA energy efficiency programs.

Regional energy consumption per capita (MMBtu)

Baseline (2010)

Average regional energy consumption is 201.7 MMBtu per capita

CO₂e emitted by emission source (fuel combustion, industrial production, agriculture, transportation), absolute and per capita

Baseline 2010 Absolute Emissions (MTCO₂e)

9.854 million MTCO₂e

- Stationary Energy Consumption and Electricity ("Fuel Combustion"): 4,579,024
- Industrial Processes ("Industrial Production"): 268,581
- Agriculture: 651,389
- Mobile Energy Consumption ("Transportation"): 3,601,352

Baseline 2010 Per Capita Emissions (MTCO₂e):

14.98 MTCO₂e per capita

- Stationary Energy Consumption ("Fuel Combustion"): 6.96
- Industrial Processes ("Industrial Production"): 0.41
- Agriculture: 0.99
- Mobile Energy Consumption ("Transportation"): 5.47

Capacity from NYSERDA-funded renewable energy installations.

Baseline (2010):

Data exist but are not publicly available across all NYSERDA renewable energy programs.

Taking Action

The following 11 actions were determined to be the most important energy-related actions for the Region to focus on. The assumptions used to calculate GHG reduction potential, and the expected GHG reduction for each relevant action, are detailed in the Appendices: Implementation Strategy and the GHG Benefits of the Implementation Strategy. Several actions are also related to the REDC Strategy; these are also noted in the Implementation Strategy. There is also more detail about the actions marked **TOP 22** at the beginning of this Plan.

▶ **TOP 22** 1. Promote energy efficiency and renewable energy in residential and commercial buildings

Goals Supported: 1 and 2

Description: Southern Tier residents will benefit from a large-scale, region-wide program that provides education, financing, up-to-date information, and application assistance to homeowners and businesses interested in reducing their energy usage. This “Southern Tier Renewable Energy and Efficiency Initiative,” first proposed in the Southern Tier Regional Economic Development Council’s Regional Strategic Plan, will be an overarching, coordinated initiative under which a number of targeted efforts will be deployed to help consumers take steps to improve the energy efficiency of their buildings. It will also coordinate education, events, website content, and outreach based on community needs and could support and advertise local efforts to provide basic energy upgrades and weatherization services. Although there are many examples of successful programs operating in the Southern Tier, the level of technical assistance and funding resources that home and business owners need to understand and act on making energy investments is not yet provided throughout the Region. This initiative would overcome that barrier by creating a one-stop shop for residents to learn about making energy efficiency or renewable investment decisions, and receive appropriate assistance.

Potential Leads: Potential lead agencies include Cornell Cooperative Extension, businesses, and economic development organizations.

▶ **TOP 22** 2. Develop a regional energy roadmap

Goals Supported: 1 and 2.

Description: A regional energy roadmap will establish a detailed plan to achieve the Southern Tier’s desired energy portfolio. It will identify potential future energy scenarios and spur action by presenting short- and long-term steps to achieve the desired scenario. The regional energy roadmap will require a proactive strategic planning process which will aim to maximize renewable energy resource development, energy efficient technology and measures deployment, and economic development, and reduced dependence on imported fossil fuels. By identifying clear action steps, the Southern Tier would invest in a process which will likely lead to specific dedication of funds and resources, as well as strategic partnerships to leverage existing initiatives. It would also provide foundational knowledge about renewables in the Region as well as gaps in developing the potential of these energy sources. The roadmap would provide a transparent plan for all community members to see the value of the investment in clean energy and the projected results. It would increase elected officials’ and the general public’s understanding and awareness about the financial and operational aspects of specific renewable energy and energy efficiency. Since there is currently no regional organization focused on the Southern Tier, it will be a challenge to find an entity to take on such a task at the regional level. This action will require substantial funding to hire staff and technical experts to complete analysis and develop the roadmap with significant input from the community and elected officials. The Region intends to overcome these barriers by using the partnerships formed as a result of this Cleaner Greener Southern Tier planning program to explore solutions in a comprehensive manner.

Potential Leads: This project could be led by the regional planning boards or Cornell Cooperative Extension, in partnership with local governments and universities.

▶ **TOP 22 3. Explore and create financing options for renewable energy and energy efficiency systems**

Goals Supported: 1 and 2

Description: One critical action that received widespread support and interest during the Cleaner Greener Southern Tier Plan public involvement process was to provide additional financing options for energy efficiency and renewable energy projects. Stakeholder groups, as well as public meeting and website input, identified the need to empower local government, agencies, and financial institutions to develop financing options to assist businesses and homeowners. Initial investment and long payback periods are often disincentives to retrofitting buildings and installing renewable systems. Innovative financing options can overcome this lack of up-front capital. Providing additional financing will allow home and business owners to invest in energy efficiency measures in buildings and operations and to replace a portion of energy generated by fossil fuels with renewable energy technology. Making these investments offers some of the largest GHG reductions available in the Southern Tier. The establishment of financing mechanisms, such as a green revolving loan fund, a loan loss reserve to leverage private capital, third-party leasing, energy loan discounts, bond financing, and sales tax abatements and exemptions for energy efficiency projects, will ensure that funding for retrofits and renewable energy systems is available in the future. This action will help address the lack of experience in the Region with some of the creative financing methods that are being tried successfully in other parts of the country. Methods that could be used to overcome that barrier include bringing in speakers from municipalities, banks, venture capital managers, and others who have successfully implemented various financing programs, applying for grants to hire experts to help build financing programs or to capitalize a loan program, and setting up roundtable discussions for interest groups in the Region to share ideas and collaborate on solutions.

The Alternatives Federal Credit Union (AFCU) in Tompkins County offers special discounts on loans for green home renovations, as well as solar panel installations, and hybrid vehicle purchases.

Initial investment and long payback periods are often disincentives to retrofitting buildings and installing renewable systems. Innovative financing options can overcome this lack of up-front capital. Providing additional financing will allow home and business owners to invest in energy efficiency measures in buildings and operations and to replace a portion of energy generated by fossil fuels with renewable energy technology. Making these investments offers some of the largest GHG reductions available in the Southern Tier. The establishment of financing mechanisms, such as a green revolving loan fund, a loan loss reserve to leverage private capital, third-party leasing, energy loan discounts, bond financing, and sales tax abatements and exemptions for energy efficiency projects, will ensure that funding for retrofits and renewable energy systems is available in the future. This action will help address the lack of experience in the Region with some of the creative financing methods that are being tried successfully in other parts of the country. Methods that could be used to overcome that barrier include bringing in speakers from municipalities, banks, venture capital managers, and others who have successfully implemented various financing programs, applying for grants to hire experts to help build financing programs or to capitalize a loan program, and setting up roundtable discussions for interest groups in the Region to share ideas and collaborate on solutions.

Potential Leads: Lead agencies include regional planning boards, municipalities, community banks, Southern Tier Regional Economic Development Council, county financing authorities, and Community Development Financing Institutions (CDFIs).

▶ **4. Assess energy performance, implement, and monitor energy efficiency upgrades in government facilities**

Goal Supported: 1

Description: This action includes performing comprehensive energy audits or inspections of major government buildings including municipal, state, regional, and other agencies such as school districts, water and waste utilities, and airports. It includes identifying and implementing effective cost saving and energy saving strategies; maintaining performance through retro-commissioning; and monitoring these improvements through ongoing inspections and benchmarking. Energy audits identify the potential for basic improvements such as air sealing and lighting upgrades, along with more ambitious measures such as high-efficiency heating systems, building envelope retrofits, and renewable energy. Because systems decrease in performance over time, retro-commissioning is a practice of testing and correcting a building's mechanical systems to ensure that they perform as intended, reducing energy losses over the lifespan of a building. Monitoring energy use through benchmarking building energy use is a popular and free way to quantify energy savings. This enables facility managers to catch spikes in energy use and resolve issues quickly. This type of monitoring may also identify the possibility of moving operations into an off-peak energy demand cycle. Benchmarking building energy use will also provide easy access to data for a greenhouse gas inventory. This initiative would also include auditing and upgrading inefficient outdoor lighting around government and municipal buildings, as well as streetlights.

Potential Leads: Since there is a general lack of understanding of energy performance contracting and energy auditing for government facilities in the Region, this action will work to overcome that barrier by enlisting regional planning agencies, councils of government and others in educating elected officials, boards, administrators, and facilities managers of municipal and other government agency buildings.

▶ **TOP 22 5. Facilitate deployment of solar photovoltaic and solar thermal systems**

Goal Supported: 2

Description: This action focuses on the regional deployment of solar electric photovoltaic (PV) which produces electricity, and solar thermal, which produces heat or hot water, for household, commercial, institutional, and industrial applications using energy from the sun. In 2011, the Region had well over 500 solar installations in place, mostly solar PV. Opportunities for deploying this technology using state tax incentives and subsidy programs are expected to continue; New York State has emphasized expanding solar PV as a renewable resource under its Renewable Portfolio Standard (RPS), which sets a goal to increase renewable electricity sources to 30 percent by 2015. Solar energy can lower the costs of heating and electricity in homes and businesses, reduce the use of fossil fuels which may rise in cost, and lower greenhouse gas emissions. Deployment of solar PV and solar thermal systems can be enhanced by launching community “solarize” campaigns to aggregate purchase and installation of solar systems, attract leasing companies, and bring down the cost of individual systems. Also, there is potential for increasing local jobs in solar businesses related to installations, potentially 55 jobs over 20 years if deployed aggressively region-wide to expand capacity from the current 4 MW to 110 MW, supplying 2 percent of regional electricity use at today's consumption rate, within twenty years. This equates to doubling solar capacity approximately every four and a half years. Much of the Southern Tier does not have the critical population mass to readily attract private financing and the initial cost of solar installation is high, unless purchased at a substantial discount via bulk purchasing or other means. Therefore, one promising method to overcome this barrier in the Southern Tier is by implementing solar aggregation programs. Contractor costs are lower, Federal and state tax credits and state incentives are applied to their fullest extent, the complexity of reviewing technical specifications and multiple contractors is aggregated in a group effort, and low price and reduced effort helps customers to act more quickly, overcoming customer inertia. Additionally, while residential solar installations are generally allowed under zoning codes, they may face obstacles in some homeowner association covenants, and large commercial installations may face permitting issues. Additional education and outreach and updating zoning codes and homeowners association covenants would address these barriers.

Potential Leads: Potential leads include regional planning and development boards, municipalities, non-profits, and Cornell Cooperative Extension.

▶ **6. Study and facilitate mid-scale wind projects**

Goal Supported: 2

Description: This action is to conduct a detailed study of the wind resource to determine micro wind climates that would support mid-scale wind. Mid-scale, or community-scale, wind turbines produce at least 100 kilowatt (kW). The analysis would include information on distinct wind power classes, electricity infrastructure, utility boundaries, and certain physical or population constraints. This would allow for accurate scoping of potential deployment and energy generation. Site-specific feasibility studies will be required to determine exact placement of wind turbines, at any scale, plus funding availability for larger scale projects. This action focuses on mid-scale wind, since large-scale industrial wind farms will generally be feasible as private-sector initiatives if the federal production tax credits are continued. It is proposed that two initial wind turbines be piloted in the Region; one on a farm and one on municipally-owned land so as to demonstrate application differences and similarities. One source of funding that might be available for a farm-based turbine pilot is through USDA renewable energy incentives. Since renewable energy technologies continue to be more expensive than fossil fuel technologies, identifying the sites with the most wind potential, and funding to implement mid-scale pilot projects, can help to demonstrate their feasibility.

Potential Leads: Possible leads for this action include municipalities, institutions, such as universities, public schools, airports, and hospitals, large businesses, and agricultural support agencies, such as Cornell Cooperative Extension.

▶ 7. Facilitate deployment of demonstration anaerobic digester systems

Goal Supported: 2

Description: This action is to encourage the widespread adoption of anaerobic digesters, especially on farms. Anaerobic digestion of animal manure produces biogas, including methane gas, which can be used to fuel an engine generator or turbine to generate electricity and heat. As with mid-scale wind, the pilot deployment of a few digester systems, accompanied by case studies of the projects, could serve as the basis of education and outreach for this program. Additionally, a “community anaerobic digester” could be developed, in which an industrial facility in a rural community takes on some of the cost and operations of the facility, instead of an individual farmer. Nearby farmers could bring waste (manure) to fuel the digester. Chobani Yogurt in Chenango County is in a prime location to take advantage of this opportunity, using both farm waste and dairy manufacturing waste to fuel electricity production for the yogurt plant and the community. Due to a lack of understanding of the technology, high upfront costs, and the lack of time and capacity for individual farmers to implement such an initiative, this practice has not yet been widely adopted in the Southern Tier. This action will address those barriers with technical assistance and funding to implement pilot projects and disseminate results.

It is estimated that there is the potential for 31 anaerobic digesters in the Southern Tier that could produce between 19,000 MWh and 70,000 MWh of electricity per year, while reducing methane emissions and groundwater pollution.

Potential Leads: Possible leads for this action include agricultural support agencies, such as Cornell Cooperative Extension, municipalities, and large waste-producing institutions and businesses.

▶ 8. Facilitate deployment of geothermal heat pump systems

Goal Supported: 2

Description: This action is to encourage the widespread adoption of geothermal heating systems in the Region. Geothermal heat pump (GHP) systems utilize the constant temperature of the ground to pre-heat or pre-cool fluid (air, liquid, or anti-freeze) to reduce HVAC energy requirements. Geothermal heat pumps require boring holes in the earth for vertical systems, or digging trenches for horizontal systems, and require specialized contractors to design and install. Because geothermal heat pump systems can be deployed almost anywhere, there is potential to decrease heating and cooling energy requirements substantially, especially in new residential and smaller commercial buildings. Increased access to low cost financing can help defray high initial costs. NYSERDA offers financing assistance for geothermal heat pumps through the New Construction Program for commercial/industrial businesses and residential incentive programs. Although not currently cost-competitive with natural gas, geothermal can be a dependable solution for rural residents and business owners to decrease their dependency on oil, propane, or electric systems. Due to the high cost of installation, and lack of awareness of its potential, increased education and funding support can help demonstrate GHP system feasibility in the Region. Efforts should be targeted at rural areas where natural gas is not available, since GHP can be more economically competitive with electric, fuel oil, and propane systems.

Potential Leads: Possible leads for this action include regional planning agencies, counties, energy contractors and energy support agencies, such as Cornell Cooperative Extension.

▶ 9. Explore transitioning existing power and thermal generation facilities to more sustainable fuel

Goal Supported: 2

Description: This action strives to keep existing power plants in the Region viable into the future by exploring transitioning the fuel source to renewable resources. Aging coal-fueled power plants are struggling to maintain operations, with shutdowns occurring and municipalities that rely on those job and tax generators facing potential fiscal challenges. While the transition away from coal power supports sustainability goals for the Region, the loss in economic value from lost employment and lost tax revenues will hurt the Region. Keeping these facilities in production provides a means of local energy generation that

may relieve brownout situations and adds a measure of diversity in the power mix while transitioning to renewable sources.

One way to preserve these benefits would be to transition these facilities to more sustainable fuels, beginning with co-firing using biomass or industrial by-products, which are plentiful in the Region. The Region can also support the transition of fossil-based thermal energy facilities toward the use of renewable fuels and more efficient combined heat and power operations. These goals are described in more detail below, under specific actions in support of biomass, district heating, and CHP. Although it is difficult to identify sufficient amounts of consistently available non-fossil fuels (other than bio-mass) to supply the needs of large scale generators, working with regional industries to determine available waste streams across a variety of manufacturers and processors could prove the feasibility of alternate fuels.

Potential Leads: Possible leads for this action include power plant operators, regional planning agencies, solid waste managers, and counties.

▶ **TOP 22** 10. Facilitate use of biomass for heating

Goal Supported: 2

Description: Many homes and businesses in the Southern Tier rely on high-cost and high-emissions sources of heat, such as fuel oil, propane, and coal. This is particularly true in the rural areas of the Region that are not served by natural gas. By switching to local biomass – wood and, potentially, fast-growing renewable crops – residents and businesses could obtain heat at reduced prices, create jobs, and increase income in rural areas. Using locally-sourced biomass for heating fuel builds the rural, agricultural economy and keeps money in the Southern Tier rather than sending it out of the Region to purchase fuels sourced elsewhere. Another benefit of utilizing biomass is that it has tremendous potential to reduce GHG emissions when used in lieu of conventional fossil fuels, as long as the biomass is sourced responsibly. However, as with any fuel source that is burned, biomass systems have the potential to impact air quality. Biomass systems should be high-efficiency and low-emission systems in order to reduce their impact. The selection of biomass systems and fuels should take air quality impacts into consideration. By coordinating the efforts of Cooperative Extension, area nonprofits, equipment dealers, and installation contractors, consumers and facilities managers can be educated about the benefits and savings from installing biomass boilers in residential, commercial and institutional heating. The most critical need is to build the market demand for biomass; the resource is ready for significantly increased production but a much larger number of consumers are necessary to achieve maximum marketability. This can be accomplished by outreach and marketing to residential consumers, as well as targeted education of school, institutional and government facilities managers. Although most current production uses wood byproducts to produce pellets, there is also potential for better coordination of forest and crop landowners to grow and harvest raw biomass resources for production and marketing as a heating fuel. While non-wood agricultural products have potential, systems that utilize them are still in the early stages of development.

Potential Leads: Potential leads for this action include Cornell Cooperative Extension and regional planning boards, in conjunction with local governments.

New England Wood Pellet LLC in Delaware County is the largest biomass wood pellet manufacturing facility in the Northeastern U.S., and produces enough renewable energy pellets annually to heat 25,000 homes and businesses.

▶ **TOP 22** 11. Facilitate Use of combined heat and power in private development projects and public facilities

Goal Supported: 2

Description: Combined heat and power (CHP), also known as co-generation, is an innovative technology which increases energy efficiency at existing electricity generating or steam/hot water facilities which generate energy on site. In these facilities, the “waste” heat from the combustion process to produce electricity is captured and utilized. In this way, electricity and thermal energy are produced from a single fuel source, resulting in significant efficiency improvements, energy savings, and emissions reductions. According to the EPA, a 5 MW natural gas-fired CHP system produces just half the GHG emissions of a separate heat

and power system. While CHP systems are often fueled by natural gas, they can also be installed as biomass systems. Combined heat and power is an economical way to reduce the primary energy consumption and GHG impact of existing industrial, commercial, agricultural, and government facilities, while also reducing the impacts from energy demands associated with new development in the Region. According to the DOE, "packaged CHP systems" integrated into commercial buildings can offer up to a 40 percent improvement in building efficiency over conventional heating systems. In addition to the GHG emissions benefits and cost savings, CHP systems can increase power reliability, enhance power quality, and increase operational efficiency.

The Arnot Ogden Hospital in Elmira has integrated CHP technology into its facility, and is serving as a model for Cayuga Medical Center, which is currently investigating transitioning its energy plant.

Local governments and regional agencies could establish a program to evaluate the economic feasibility of adding CHP to facilities that are directly under government control, including identifying target facilities, guidelines for screening facilities, and guidance for evaluating economic feasibility. CHP projects typically require multiple layers of approvals such as electric utility interconnection, natural gas connection and supply, construction and operating approvals, and permit requirements. Local governments can develop model procedures and schedules and facilitate information exchange among all of the economic and regulatory stakeholders. The Southern Tier can also support CHP development by promoting the inclusion of CHP as a covered technology for local option property tax exemption. There is not widespread understanding or knowledge of CHP technology in the Southern Tier. Additionally, the systems can be expensive to purchase and install and require significant up-front expenditures. Balancing peak winter heating needs with peak summer electricity demand can make it difficult to maximize efficiency. These barriers can be addressed by developing and implementing a marketing campaign targeted to private and public facilities and management staff and board members of school districts, institutions, local governments, and other entities responsible for aging physical plants. Grants or low-interest loans to help cover higher initial costs or feasibility studies could help overcome the cost barrier.

Potential Leads: Local governments, regional agencies, school districts, institutions, and businesses.

TRANSPORTATION

The existing transportation system in the Southern Tier Region was created to solve 19th and 20th century problems; 21st century problems, including GHG emissions, fuel costs, aging population, and road maintenance, require changes in the system. Commute patterns are the single most important factor in household fuel consumption; these patterns were analyzed along with community development goals to determine appropriate strategies. The movement of products and materials are the second largest contributor to fuel use in the transportation sector. This chapter addresses issues and opportunities relating to the movement of people and goods in the Region and identifies priority actions and associated GHG reduction targets to meet the two transportation goals:

3. **Create a regional multi-modal transportation system that offers real transportation choice, reduced costs and impacts, and improved health.**
4. **Reduce fossil fuel consumption and GHG emissions from transportation by reducing vehicle miles traveled, increasing efficiency, improving system operations, and transitioning to less carbon intensive fuels and power sources.**

Snapshot of the Region Today

The Southern Tier's transportation system connects its rural towns, villages, and hamlets to its six small cities. Three interstate highways serve the Region, along with a strong network of state and local roads, several freight railroads, and a variety of private and non-profit transportation providers. The newly converted Interstate 86 (I-86), which runs east-west, touches five of the Southern Tier's eight counties, connecting Binghamton, Elmira, and Corning with Erie, PA to the west, and New York City to the east. The Region is also served by bus transit systems in each of its small cities, and a growing network of multi-use trails. These trails are primarily located within and around the cities of Binghamton, Elmira, and Ithaca, where the population densities are the greatest and where the Region's three MPOs are located.

FIGURE 13 ■ Southern Tier Transportation Network



The Southern Tier is the only one of the state's regions that does not have passenger rail service, but it does host three primary freight rail routes. While forecasts do not predict congestion impacts from projected increases in

freight traffic,⁵⁸ recent estimates from the Southern Tier Regional Economic Development Council suggest that extraction of natural gas could put pressure on the existing rail system that would require upgrades.

In 2010, the average Southern Tier resident drove 10,498 miles per year – about one thousand miles more than the national average. This means that the average Southern Tier resident travels by car approximately 29 miles per day. Region-wide, about 76 percent of commuters drive alone to work, though this ranges greatly among individual county populations. For example, only 57 percent of Tompkins County commuters drive alone while 83 percent do so in Tioga and Chemung Counties.

On average, 19 percent of Southern Tier commuters walk, bike, ride the bus, or carpool. Tompkins County has the highest rate of alternative transportation trips to work at 36 percent, largely due to the presence of two institutions of higher education that are connected to a walkable downtown by a strong transit system.



The majority of the Region’s population works and resides in the same county. In six of the eight counties, more than two-thirds of local residents commute daily within their home county. Only Schuyler and Tioga residents primarily work outside of the county. The more rural counties oriented along the edge of the region – Delaware, Steuben, and Tioga – have annual per capita vehicle miles traveled exceeding 12,000, reflecting the longer trips necessary to arrive at workplaces and access services. While there are important intercity transit needs, and potential for improved service along select routes, the majority of work-based trips occur within counties. However, in-commuting into the Region is significant, including from neighboring counties, primarily to the north and east of Steuben and Tompkins Counties. For example, approximately 15,500 persons per day travel into Tompkins from adjacent counties. Similarly, commuters from the Northern Tier counties in Pennsylvania cross into NYS daily for work, particularly into the Greater Binghamton area. Automobile trips account for the majority of trips taken between counties in the Region. With current and projected increases in fuel prices, many households will be negatively impacted, especially low-income workers.⁵⁹

Within the Region, there is a high level of interest in enhanced non-single occupancy vehicle infrastructure – via expanded bicycle, pedestrian, and transit networks, as well as through innovative programs that support transportation needs with a range of connected services. This desire to offer more transportation options to improve mobility is echoed in many of the Region’s transportation plans, studies, and comprehensive plans.

Commuting among the counties within the Region for employment is quite high, with over 36,000 residents commuting to another county within the Southern Tier. The most common inter-county commuting trips are:

TABLE 12 ■ Inter-county Commuting Trips

County of Residence	County of Employment	Number ⁶⁰
Tioga	Broome	8,065
Steuben	Chemung	3,532
Chemung	Steuben	3,419
Broome	Tioga	2,870
Tioga	Tompkins	2,846
Chenango	Broome	2,337

⁵⁸ From Binghamton Metropolitan Transportation Study and the Ithaca-Tompkins County Transportation Council.

⁵⁹ From the draft Regional Transportation Study (RTS), a planning project led by the Ithaca-Tompkins County Transportation Council and its partners in the Regional Transportation Planning Coalition to study transportation in the seven-county area including the counties of Cayuga, Cortland, Tioga, Chemung, Schuyler, Seneca, and Tompkins.

⁶⁰ U.S. Census Bureau. Residence County to Workplace County Flows for New York (2000). Internet Release Date: March 6, 2003.

The Broome County-Tioga County inter-county commuting was strong (> 2,000 persons in each direction) as was the Chemung County-Steuben County connection. Broome County had the most in-commuting workers (11,500) from other counties in the Southern Tier and Tioga County had the most residents (11,900) commuting to another county in the Region.

The Region attracts over 30,000 residents of surrounding counties to jobs within the Southern Tier. Both Broome and Tompkins Counties attract over 7,000 in-commuters from outside the Region. Out-commuting from the Region is also significant; over 23,000 residents leave the Region for employment. Over 5,000 residents of Steuben County leave the region for work, with 1,000 or more working in each of three counties: Allegany, Livingston, and Monroe. Relatively few inter-county commute trips appear to be made by transit; only four percent of the 1,000 commuters arriving in Tompkins from Chemung take a bus, and just one percent of those arriving in Tompkins from Tioga do.

Eight transit systems provide over 7.4 million bus rides across the Southern Tier each year. Bus service is provided primarily at the county level, with the largest system hubs in Binghamton and Ithaca. Transit providers in the Region offer fixed route bus service to their downtowns in addition to some intercity, demand response, and rural services. Two State University of New York (SUNY) schools also offer some fixed route bus service for students, primarily on campus. Other non-profit and private providers supplement these services by providing a limited number of routes focused on medical transportation.

TABLE 13 ■ Transit Systems Serving the Southern Tier

Agency	Service Area	Service Provided	2010 Ridership ⁶¹ (unlinked trips)
County-based Systems			
Broome County Transit (BC Transit)	Broome County	Bus service, BC Lift (paratransit), BC Country (Rural shared ride), Minibus service-Office of Aging	3,000,000
Chemung County Transit System (CCTS)	Chemung, Steuben (partial), Tompkins (partial), and Pennsylvania (Sayre)	13 fixed routes with intercity service to: Ithaca, Corning, and Sayre + rural route deviation	686,000
Steuben County Transit	Bath, Corning, Hammondsport	Scheduled bus service within & between Villages; links to Hornell Area Transit, Demand Response Service	Not available
Tioga County Transit (Ride Tioga)	Tioga, Tompkins, Broome, Pennsylvania	Scheduled bus service, dial-a-ride, route deviation + Intercity service to: Ithaca, Dryden, Waverly/Sayre, Vestal	70,000
Tompkins Consolidated Area Transit (TCAT)	Tompkins County	Fixed route bus service, paratransit, Gadabout service for older & disabled residents	3,640,000
Local Systems			
Corning Erwin Area Transit System	Corning and surrounding area.	Fixed route with route deviation and free Corning Museum of Glass shuttle	Not Available
Hornell Area Transit System (HAT)	Hornell and surrounding villages	Fixed route, route deviation + demand response. Serves: Almond, Alfred, Bath, Canisteo, and Wayland	Not Available
Universities			
Binghamton University Off Campus Transport	Campus and downtown Binghamton	Fixed route service on campus and to downtown areas. Drivers are students	Not Available
SUNY Morrisville MAX Shuttle Service	Campus, Oneida, Hamilton, and Utica.	Regular campus shuttles, scheduled shop-n-ride shuttles to area retailers	Not Available
TOTAL			7,396,000 +

⁶¹ "Table 19 – Operating Statics and Service" National Transit Database, Federal Transit Administration, 2010. Available online: http://www.ntdprogram.gov/ntdprogram/database/2010_database/NTDdatabase.htm

Vehicles accounted for approximately 3.2 million MTCO₂e in 2010 or 88 percent of the Region's transportation emissions, and 32 percent of all regional emissions. Off-road transportation accounted for 3 percent of transportation emissions, with other sources (marine, rail, and air) responsible for the last 3 percent.

Issues and Opportunities

The Southern Tier faces a multitude of challenges and opportunities with regard to transportation, as it relates to energy usage, costs, and as a means to get people to work and play in the Region.

Issues

Established land use patterns and infrastructure are oriented toward automobile use, not walking, biking, or transit. Transit programming and pedestrian and bicycle infrastructure lag, in part, because of the dispersed population; density and connectivity are needed to create robust transportation choices. While motorists from large urban regions would appreciate the wide open roads and low congestion levels evident in a rural region like the Southern Tier, these attributes actually encourage single occupancy vehicle trips, limiting inherent incentives for using other modes of transportation. Another barrier is the geographic breadth and low density of development that makes transit operations expensive. On-demand service fills gaps but is very expensive. Significant funding cuts to MPOs to provide transportation planning and programs are taking place, making it more difficult to develop new routes and services while maintaining the existing level of service. Public transit systems are also facing constrained State and Federal support. One of the largest barriers to expanded and new transit service is public perception; as the majority of the population lives in rural areas where there is no service, many Southern Tier residents have little experience with transit and may not be comfortable using it. These barriers can be overcome by incorporating public outreach into system planning, and by marketing alternative transportation options aggressively.

Future transportation decisions need to consider shifting demographics in the Southern Tier. An aging population will create demand for expanded, often costly, transit services for the elderly, particularly those in more remote rural areas. Meanwhile, younger residents may mirror an emerging national trend – a shifting preference toward compact, walkable communities that do not require vehicles for daily trips. These two groups together may provide interesting opportunities for providing transportation options that can reduce individual car use and related GHG emissions.

While significant steps can be taken at the local and regional level to overcome these challenges, they certainly will be augmented by the impact of external factors that influence transportation choice and GHG emissions. These include gas prices, vehicle fuel economy, and innovation in vehicle fuel technology, which are determined by the transportation industry, State and Federal regulations and incentives, and the global economy. The role of gasoline prices in determining consumer behavior cannot be overstated. As prices climb at the gas pump, drivers search for ways to lower those costs, be it taking the bus, sharing rides, or carefully planning trips to maximize the errands accomplished in one trip to town. Another example of external factors influencing vehicle fuel costs and emissions is the Federal Corporate Average Fuel Economy (CAFE) standards. It is estimated that the new 2010 Federal CAFE standards will reduce emissions in the Region by approximately 240,000 MTCO₂e by 2032 beyond the actions in this Plan.

It will be challenging, but it is critical to coordinate transportation actions closely with the three NYSDOT regions whose service areas overlap the Southern Tier, along with the three MPOs, to ensure continuity in planning and transportation infrastructure development in the future.

Opportunities

Outreach for the Cleaner Greener Southern Tier planning process revealed a high level of interest in building more choice into the transportation system, including expanded bicycle, pedestrian, and transit networks. Other innovative programs were identified to support transportation needs with a palette of connected services. Nearly a quarter of the Region's workers carpool, use transit, bike, walk, or work from home. However, there is a

large variation between counties. Tompkins County has a particularly high non-single occupancy vehicle mode share at 43 percent, identified in one analysis as the second-highest biking and walking mode share in the country, after New York City.⁶² This is due, in part, to having a relatively robust transit system supported by major employers; trails, sidewalks, and bicycle facilities available in the more densely developed portions of the county, neighborhoods located within easy walking distance of employment centers, and a large student population. This demonstrates significant potential for increased mode share change in more-densely populated areas of the Region.⁶³

Residents and community leaders have strong interest in revitalizing existing downtowns, villages, and hamlets, and there is support for providing incentives for mixed-use infill development. Redevelopment of these areas holds potential for increasing density and activity in these hubs, which can support greater transit options and increased walking and biking. In addition, the majority of the Region's ten colleges and universities are actively working to reduce vehicle use by students and staff. These institutions are leaders in enhancing the Region's multimodal transportation system, providing expertise on sustainability and transportation, as well as resources for transportation services. These efforts, along with local climate action plans developed by three of the institutions (Ithaca College, Binghamton University, and Cornell University), as well as the cities of Binghamton and Ithaca, the Town of Ithaca, and Tompkins County, provide a framework toward achieving regional GHG emissions reduction goals.

A regional transportation study covering half of the Southern Tier counties is underway, and may lead to more fully developed local transportation solutions in these communities. Two of the three MPOs in the Region are collaborating on this project, and all three MPOs are coordinating efforts to create a more seamless transportation experience for residents throughout the Region.

Finally, trail initiatives underway highlight a strong interest in expanding walking/biking infrastructure, as indicated by the development of several trails, trail plans, and walking and biking studies. Examples include the Two Rivers Greenway, Catherine Valley Trail, Delaware County Trail Initiative, Cayuga Waterfront Trail, and Black Diamond Trail. Portions of existing and planned recreational trails could facilitate commuting and non-work bicycle and pedestrian trips within the Region. Although the costs of constructing bicycle and pedestrian facilities are relatively low compared to roads or transit, they are still significant investments, and in parts of the Southern Tier, established land use patterns and infrastructure are oriented toward automobile use, not walking, biking or transit. These can be overcome by identifying critical network gaps near well-used facilities, focusing resources on key connections, and requiring new facilities to be complete streets.

Priority Actions identified for transportation improvements were derived from successful and innovative programs such as:

- **511NY Rideshare Southern Tier:** A pilot project through NYSDOT is examining ways to integrate upstate ridesharing with the current downstate 511NY Rideshare system using the same online ridematching platform.
- **Ithaca Carshare:** Ithaca Carshare is Ithaca's non-profit carsharing organization, which launched in 2008. It currently has over 1,000 members. Its board of directors includes representatives of the City, County, and Cornell University.
- **Bike Share Programs:** Binghamton Bike Share, Cornell Big Red Bikes, and the City of Ithaca pilot bike share program indicate a growing interest in biking as a real transportation option. Bike share programs can also support commuting by transit by providing a convenient means of getting to and from the bus.

⁶² "Active Transportation Beyond Urban Centers: Walking and Bicycling in Small Towns and Rural America," Rails to Trails Conservancy, January 2012, Available online: <http://www.railstotrails.org/ourWork/reports/beyondurbancenters.html> p. 13.

⁶³ U.S. Census Bureau American Factfinder, Table B018301: Journey to Work, American Community Survey 5-year Estimates for 2006 – 2010. Retrieved July 18, 2012 from <http://factfinder2.census.gov>.

- **Way2Go:** Way2Go is both a website and education program that aims to increase public understanding of existing transportation options and foster public dialogue in order to improve transportation equity and sustainability.
- **Greenride and Zimride:** Greenride is a ridesharing service based in Broome and Tioga Counties supported by the Binghamton Metropolitan Transportation Study (BMTS, the MPO). Similarly, Zimride Tompkins provides ridesharing networks for the Tompkins County community, Cornell, Ithaca College, and Tompkins Cortland Community College. Ithaca Carshare and Zimride cross-promote when booking services.

A Southern Tier Example

Two Rivers Greenway – City of Binghamton

In 1999, a study commissioned by the City of Binghamton determined that it would be feasible to create a regional system of riverside bicycle and pedestrian trails. Once complete, the Greater Binghamton Greenway (soon to be named the Two Rivers Greenway) will be a 30-mile network of trails and riverside parks that link important areas throughout the Region, including main streets in Binghamton, eastern Broome County and Tioga County; residential neighborhoods along the trails; Binghamton University; and parks and open spaces along the Susquehanna River.

The successful completion of the Greenway hinges on both private and public investment. One key remaining segment, the Rt. 434 Greenway Construction Project, will provide a separate pedestrian and bicycle facility between downtown Binghamton and Binghamton University, while linking adjacent neighborhoods with parks, schools, shopping, and new student housing.

NYS DOT is funding the design and right-of-way activities for the project with Federal transportation dollars, but local government funding and private investments are also needed to bring the project to completion. Approximately 56 percent of the Greenway is either built, under construction, or funded. The remaining projected cost stands at \$7.15 million. Keeping the Greenway maintained will also require a collaborative effort, with municipalities contributing to keep each community's part of the Greenway operational.

Immediate benefits from this project include construction jobs. According to NYS DOT, recent studies show that the Greenway is producing more jobs than a typical highway or bridge project. Another primary benefit is increased potential for outdoor activity, exercise, and public health. The trail system provides a beautiful and safe place for residents to travel to local shops, parks, and schools, and will encourage people to ride bicycles or walk more. This is a key goal of the New York State Department of Health's (NYSDOH) Healthy Communities program.

Developers, community members, and Binghamton University all see the benefits the Greenway has already brought and will continue to bring to the Region. The Greenway also has the potential to bring tourism and new business by providing easy access by bicycle or foot to local businesses in areas previously only accessible by car. Environmental benefits include decreased car use and reduced GHG emissions for everyday commuters who utilize the trail. Additionally, the creation of parks and green spaces along the trail will serve as an educational resource for the community, including the University and local schools. The Two Rivers Greenway will enhance community connectivity, public health, and the overall quality of life for people in the Region.



Strategy for the Future

Goals

3. **Create a regional multi-modal transportation system that offers real transportation choice, reduced costs and impacts, and improved health.**
4. **Reduce fossil fuel consumption and GHG emissions from transportation by reducing vehicle miles traveled, increasing efficiency, improving system operations, and transitioning to less carbon intensive fuels and power sources.**

These two goals were selected for Transportation in recognition of the fact that in the largely rural Southern Tier, where there are not significant disincentives to driving alone such as traffic congestion and high parking costs, it will be critical to develop regional solutions and motivators to reduce vehicle miles traveled.

Indicators and Targets

All three indicators will help to track progress in addressing both of the goals. Data are available for these indicators, although not always on an annual basis. Seven priority actions were identified through the Cleaner Greener Southern Tier planning process to increase transportation choice and make significant reductions in energy consumption and GHG emissions in the transportation sector, based on technical analysis, stakeholder support, feasibility, and greatest GHG reduction potential. The actions related to providing facilities that support non-vehicular transportation and that assist in making carpooling more widespread will help to achieve the targets related to decreasing the use of single-occupancy-vehicles (SOV) for commuting. As a result, other trips by SOV will be reduced as well. These changes, along with efforts to provide the infrastructure to support alternative-fuel vehicles should be reflected in a reduction in gasoline sales within the Region. As transportation is responsible for 37 percent of GHG emissions, it is critically important to implement these and other actions in coordination with State and Federal regulations and in support of technological innovation.

In order to quantify the GHG reductions that may be expected, assumptions were made about the anticipated implementation of each action over the next 20 years. By 2032, the Southern Tier can expect to reduce GHG emissions by 442,000 MTCO₂e by implementing these actions. This represents a 12 percent reduction in emissions from 2010 levels in the transportation sector, and a four percent reduction in the overall GHG emissions for the Region. All of these priority actions will need to be implemented to achieve these goals and targets over the Plan's 20-year timeline; other supporting actions can be found in the Supplemental Actions list in the Appendix.

Taking Action

The following seven actions were determined to be the most important transportation-related actions for the Region to focus on. The assumptions used to calculate GHG reduction potential, and the expected GHG reduction for each relevant action, are detailed in the Implementation Strategy in the Appendix. Several actions are also related to the REDC Strategy; these are also noted in the Implementation Strategy. There is also more detail about the actions marked **TOP 22** at the beginning of this Plan.

INDICATORS
<p>Total percentage of workers commuting via walking, biking, transit, and carpooling.</p> <p>Baseline (2010) 19% of commuters</p> <p>Targets</p> <ul style="list-style-type: none"> ▪ Long Term (20 year): Increase non-SOV mode share to 28% ▪ Short Term (5 year): Increase non-SOV mode share to 21%
<p>Estimated annual gasoline sales, aggregated by county.</p> <p>Baseline (2010)</p> <ul style="list-style-type: none"> ▪ 310 million gallons <p>Targets</p> <ul style="list-style-type: none"> ▪ Long Term (20 year): Decrease regional gas sales by 40% ▪ Short Term (5 year): Decrease regional gas sales by 2.5%
<p>Vehicle miles traveled per capita</p> <p>Baseline (2009) 10,497.7 VMT per capita.</p>

▶ **TOP 22** 12. Improve connectivity of pedestrian, bike, and transit routes, especially around downtowns, transit stops and schools

Goals Supported: 3 and 4

Description: Residents and community leaders throughout the Southern Tier have a strong interest in revitalizing existing downtowns, villages, and hamlets. Creating a well-connected network of bicycle and pedestrian trails and sidewalks will help create an improved downtown walking and biking environment. Providing opportunities for people to travel on foot or by bicycle leads to more vibrant business districts with less surface parking, more cohesive communities, and healthier residents. Increased physical activity can save hundreds of millions of dollars in health care costs⁶⁴ while improving access to community resources for seniors and youth. Given that sidewalk construction accounts for approximately three percent of the overall cost of rehabilitating or constructing new buildings in downtown areas, and constructing bike lanes accounts for five percent of the overall cost of rebuilding or constructing new roads,⁶⁵ investments in pedestrian and bicycle facilities are relatively small investments that yield significant benefits. A connected network of bicycle and pedestrian facilities can decrease vehicle trips and reduce associated GHG emissions. Through its impacts on community revitalization, this strategy, in combination with other revitalization action items, is likely to create additional jobs in the Region. Although the costs of constructing bicycle and pedestrian facilities are relatively low compared to roads or transit, they are still significant investments, and regular funding is limited. Walking and biking are hindered by gaps or dangerous intersections. In parts of the Southern Tier, established land use patterns and infrastructure are oriented toward automobile use, not walking, biking or transit. These barriers can be overcome by identifying critical network gaps near well-used facilities, focusing resources on key connections, and requiring new facilities to be complete streets.

Potential Leads: Potential leads include municipal transportation planners and MPOs, regional planning and development boards, or transportation advocacy groups.

▶ **TOP 22** 13. Pilot opportunities for intercity bus service, expanded cross-regional transit, and rural on-demand transit

Goals Supported: 3 and 4

Description: The existing transportation system in the Southern Tier was not designed to solve 21st century problems such as GHG emissions, high fuel costs, an aging population, and high maintenance costs. Commute patterns are the single most important factor in fuel consumption, and private vehicle travel accounts for most trips taken in the Region. Many of these trips are single-occupancy vehicle trips, so making public transportation a real and feasible option for people is needed. While the Region has transit that serves the cities and immediate environs of Binghamton, Elmira-Corning, and Ithaca, bus services between these cities is limited. There is an opportunity to explore and pilot programs to fill these transit gaps for inter-city, cross-regional, and rural on-demand transit trips. The geographic breadth and low density of development make transit operations expensive. On-demand service fills gaps but is very expensive on a per trip basis. Significant funding cuts to MPOs and transit systems are taking place, making it more difficult to develop new routes and services while maintaining existing service. Since the majority of the population lives in rural areas where there is no service, many residents have little experience with transit and may not be comfortable using it. These barriers can be overcome by incorporating public outreach into system planning, providing increased funding in partnership with institutions and employers, and by marketing transit service aggressively with other transportation services. Transit service can also be enhanced over time through changes in development patterns as discussed in the livability section.

Potential Leads: The primary leads are the three MPOs, public transit providers, universities and major employers, and private regional transportation services.

⁶⁴ Beil, Kurt. "Physical Activity and the Intertwine: A Public Health Method of Reducing Obesity and Healthcare Costs," Jan. 21, 2011. Portland Metro.

⁶⁵ Norm Steinman (Charlotte DOT) in a presentation for communities participating in the CDC's Communities Putting Prevention to Work program.

▶ **TOP 22** 14. Expand Way2Go and other transportation demand management programs

Goals Supported: 3 and 4

Description: Transportation Demand Management (TDM) initiatives encourage employees to use public transit, van and carpools, bicycle, walk, or use other alternatives to driving alone to work. Currently 76 percent of workers in the Southern Tier drive alone to work; 19 percent walk, bike, carpool, or take transit, with the remainder working from home or telecommuting. Local governments in the Southern Tier will work with the Way2Go program, other regional TDM initiatives, and 511NY Statewide TDM information system to enhance commute options, thus providing incentives for Southern Tier residents to decrease their daily car use, and particularly their use of single-occupancy vehicle trips. Way2Go is a comprehensive information hub that seeks to increase transportation access, choice, equity, and sustainability in Tompkins County. The Way2Go program provides a ride- and information-sharing forum for people wanting to take trips within the county and to destinations beyond the county. By using the website, visitors can learn about and compare different ways to get around. Way2Go also provides transit information by phone or mail, conducts public workshops and events that increase awareness of available transportation options, and shares commuter tips online. This can take advantage of NYSDOT's role in providing trip data through 511NY for use by technology entrepreneurs to develop software applications for improved communication and coordination of travel demand and system operations.

Communicating effectively about TDM programs and transportation choices with different audiences across a large rural region is a key challenge, and will need increased operational funding. Effective marketing requires getting accurate information to people in ways that are convenient, understandable and lead to action. These barriers can be overcome by educating policymakers about the benefits of expanded, better-coordinated marketing.

Potential Leads: The Region's three MPOs, Way2Go operators, other TDM programs, county staff, and 511NY are candidates to serve as key leaders for this action.

▶ 15. Facilitate development and expansion of carsharing programs

Goals Supported: 3 and 4

Description: This action promotes the expansion of carsharing, which provides hourly rental of conveniently located cars to members on a reservation basis. Ithaca Carshare is a successful local example that could be expanded in the Region. It is likely that initial efforts for expansion will be in Binghamton, with its large college population, and then possibly in Corning and Elmira. The program provides members with self-serve access to a fleet of vehicles. Rate plans are available that fit different usage patterns. Vehicles are typically placed in high visibility areas, near transit and key destinations, and with a variety of car types (vans for families, cars with high MPG, trucks for hauling, etc.). Carsharing members are usually carless households, or families that share one car and occasionally need another one. Research by Philadelphia Carshare showed that each carsharing vehicle replaces approximately 15 private vehicles. Ithaca Carshare is planning a special subsidized plan to members with low-incomes, which will lower the membership costs by more than half. Furthermore, all vehicle locations are next to bus stops, providing compatibility with transit. The Ithaca Carshare program works with local transportation education programs and relevant agencies on outreach, promotion and education surrounding transportation costs and options. A key barrier is the need for significant capital investment and operating funds for start-up or expansion. Insurance can be a difficult issue, and obtaining dedicated parking spaces near neighborhoods can take time. These can be overcome through partnerships and support from educational institutions and local government.

Local options for expansion of successful programs include Ithaca Carshare, which provides members with hourly, 24/7 access to cars parked near neighborhoods and workplaces; Zimride which allows users to post and request rides to places; and VanShare.

Potential Leads: Possible leads for this action include the three regional MPOs, municipalities, and existing carsharing programs in NYS.

▶ **16. Update parking policies, codes, management plans, and pricing**

Goals Supported: 3 and 4

Description: This action proposes that local governments and other institutions with land use authority, or that provide and manage parking, review and update a variety of policies and regulations that influence parking management. This review can assess the extent to which current parking policies may impact such issues as the number of parking spaces offered and utilized in garages, surface parking lots, and on the street; efforts to encourage walkable mixed-use communities; and the ability to achieve community goals to reduce fuel use. Such studies are generally best conducted at a district level. In addition to policy updates, employer subsidy policies such as “parking cash out,” where commuters are provided cash incentives to take alternative modes of transportation in lieu of parking, can be used to reduce demand for parking.⁶⁶ When free or inexpensive parking is offered, it can lead to overuse; if parking demand exceeds supply, the common phenomenon of “circling,” or looking for spaces, will occur and generate additional air pollution and congestion. Several recent studies show that “parking search” traffic accounts for between 30-45 percent of all traffic in downtown districts. Updating parking management strategies can encourage more efficient use of existing parking facilities, reduce parking demand and shift travel to non-SOV modes.⁶⁷ Creating policies, codes and plans takes time and community commitment to the goals embodied in the regulations, as well as funding to pay for implementation and enforcement. Although some of the costs can typically be covered through parking fees, the other barriers will need to be overcome through education and public discussion.

Potential Leads: Possible leads for this action include municipalities and regional planning agencies.

▶ **TOP 22 17. Encourage adoption of green fleet policies for public and private fleets**

Goal Supported: 4

Description: Local governments, businesses, and agencies in the Southern Tier can develop policies to better utilize existing fleet vehicles and plan for future acquisitions to increase fuel economy, achieve long-term cost savings, and reduce emissions. These policies will need to be context-specific to ensure that agencies are still able to carry out their missions. For example, in the case of police departments, some patrols may require powerful vehicles, while transport of prisoners may be accomplished with hybrid vehicles. Establishing green fleet policies helps agencies plan for and prioritize their fleet investments over time, analyzing the benefits for each vehicle type and age, and developing incentives and budget allocations to transition to greener fleets as vehicles are replaced. Successful public agency investments in green fleets can test new options, helping commercial owners to understand and track the benefits of green fleet policies that can work in the private sector as well. Developing policies is a fairly easy task, with excellent models in New York State and nationwide for guidance. However, aligning policies with implementation budgets is more challenging. Administering smaller fleets is another barrier to overcome. To right-size and green a fleet, central administration may be needed to reduce total fleet size, implement vehicle sharing, and evaluate the condition of the fleet as a whole to make the best budgetary decisions. These barriers may be eliminated through collaborative ad hoc working groups that share the experience of major fleet owners with smaller jurisdictions.

Potential Leads: Potential leads include regional agencies and local governments with vehicle fleets, particularly Solid Waste, Public Works, Highway Divisions, and Police Departments.

⁶⁶ Shoup, Donald. Parking Cash Out, Report 532 (2005), <http://www.planning.org/apastore/Search/Default.aspx?p=2439>

⁶⁷ Seattle Urban Mobility Plan. *Best Practices in Transportation Demand Management* (2008) <http://www.seattle.gov/transportation/docs/ump/07%20SEATTLE%20Best%20Practices%20in%20Transportation%20Demand%20Management.pdf>

▶ **TOP 22** 18. Create a region-wide electric vehicle and alternative fuel infrastructure deployment plan

Goal Supported: 4

Description: The Southern Tier faces a multitude of challenges and opportunities with regard to transportation and its effects on GHG emissions, costs, and the ability of residents to get to work, services, and other activities. Because established land use patterns and infrastructure are oriented toward automobile use in much of the Region, and the majority of the population lives in low-density rural areas, options are needed to reduce the transportation sector's impact on both household costs and the environment. This sector is a large consumer of energy and high emitter of GHGs in the Region, since many residents must travel long distances to reach employment, medical and other services, and amenities. Given that individual motorized transportation is the most common way for most Southern Tier travelers to reach their destinations, enhancing the energy efficiency of motorized vehicles is critical to reducing GHG emissions in the Region. Electric and alternative fuel vehicles can significantly reduce the use of fossil fuels and associated GHG emissions, particularly if the energy source is electricity derived from renewable sources. Electric vehicles are gaining some traction across the U.S. – there are currently more than 14,500 electric vehicle charging stations with at least three in the Southern Tier.⁶⁸ The external factors that influence transportation choices, particularly gas prices, which are expected to rise, will likely support this action to expand electric vehicle and alternative fuel infrastructure across the Southern Tier. Even with increased vehicle fuel efficiency for conventional cars, many electric vehicles and alternative fuel vehicles are more efficient than traditional cars.

A large barrier to deployment of alternative transportation fleets is the lack of regional and national infrastructure to support their use. Electric vehicles require availability of charging stations – both at home and around town – and some alternative fuel vehicles also require specialized infrastructure. Fuels such as biodiesel, compressed natural gas, and hydrogen fuel cells may need the support of a regional infrastructure network to be effective alternatives. State agencies such as NYSDOT and NYSERDA will be important partners, as infrastructure may need to be organized and rolled out systematically across service areas. A prioritized infrastructure plan to coordinate and deploy public and private investment and address zoning and permitting issues will help overcome these barriers.

Potential Leads: Organizations suited to lead this effort are MPOs, regional planning and development boards, and county governments.

⁶⁸U.S. DOE, "Alternative Fueling Station Counts by State," http://www.afdc.energy.gov/fuels/stations_counts.html.

LAND USE AND LIVABLE COMMUNITIES

Livable communities are compact and walkable with neighborhoods offering a variety of housing types, commercial and community services, employment opportunities, and transportation choices. These communities benefit from the interaction of people with the built environment, while preserving natural and fiscal resources. This chapter addresses demographic trends, land use and revitalization, housing needs, and affordability. This chapter also looks at the relationship among land use and jobs, business, economic growth, and infrastructure. Two livable communities goals were identified to support desired growth patterns for the Region:

5. **Strengthen and revitalize existing cities, villages, and hamlets.**
6. **Support development of housing that is energy and location efficient and offers choices to reflect changing demographics.**

Cities and villages in the Southern Tier were built and populated more than a century ago to meet the needs of a mostly pedestrian population located in urban areas that were built before automobile travel transformed transportation. The Southern Tier contains six cities and 59 villages complete with historic main streets and commercial districts adjacent to compact neighborhoods. These communities have two key ingredients necessary to support a livable community: walkable centers with mixed land uses. In addition, many of these communities are located on waterfronts, which can create both challenges (e.g., increased flood risk), and opportunities (e.g., open space, recreation, and tourism).

Beyond walkability and mixed land uses, livable places include a variety of housing types, are affordable to residents of all income levels and ages, and are efficiently located near transportation hubs and employment centers. Pleasant public and open spaces are woven into the fabric of livable communities, providing residents opportunities for social interactions and an overall high quality of life.

Snapshot of the Region Today

The People

The population of the Southern Tier as of the 2010 census was 658,000, a decline of 12,000 people since 1990. The three largest cities, Binghamton (47,376), Ithaca (30,014), and Elmira (29,200) all lost population to suburban and rural areas over the last 60 years. Today, 38 percent of the Southern Tier population resides in one of its 6 cities or 59 villages. In 1970, city and village residents represented 47 percent of the population.

Of the eight counties in the Region, the fastest-growing is Tompkins, with a growth rate of only two percent between 2006 and 2010. Growth in Tompkins, Steuben, and Chemung Counties was not large enough to

FIGURE 14 ■ Southern Tier Population, 1990-2010

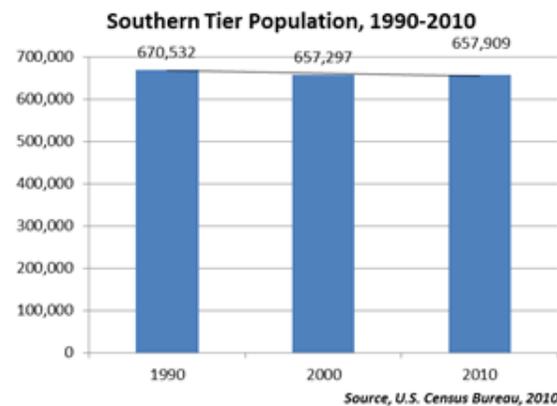
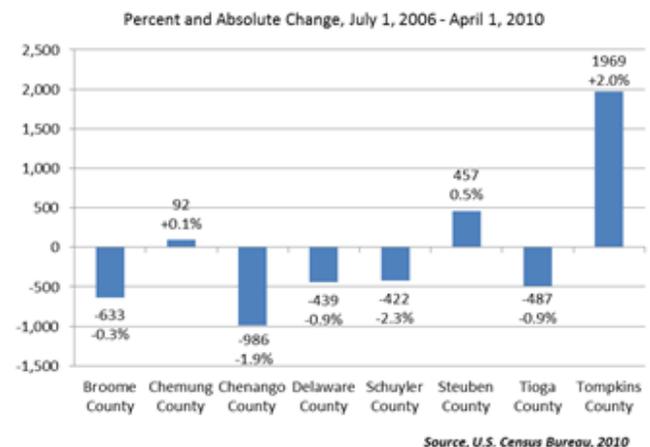


FIGURE 15 ■ Southern Tier Population Change by County, 2006-2010



outweigh population losses in the other five counties. Population loss trends are consistent with other rural upstate communities.

While the overall population has held relatively constant over the past decade, significant demographic shifts took place. The biggest change was a spike in the number of 45-64 year-olds, along with small increases in the population of seniors over 65 and youth aged 15-24. At the same time, the Region's other younger age groups declined significantly.

These demographic shifts present challenges for the Region's housing, workforce, and community services. This will be particularly problematic if the majority of the Southern Tier's population continues to age in place in low-density rural settings, where there is limited access to community, medical, and transportation services and fewer opportunities for social interaction. Anticipated rising costs for maintaining an aging housing stock, property taxes, and utilities are additional concerns for an expanding senior population. In some areas, these pressures are already manifesting themselves. For example, according to the NYS Division of Homes and Community Renewal, a nonprofit organization in Chenango County has seen a five-fold increase in the number of seniors requesting reverse mortgage counseling.

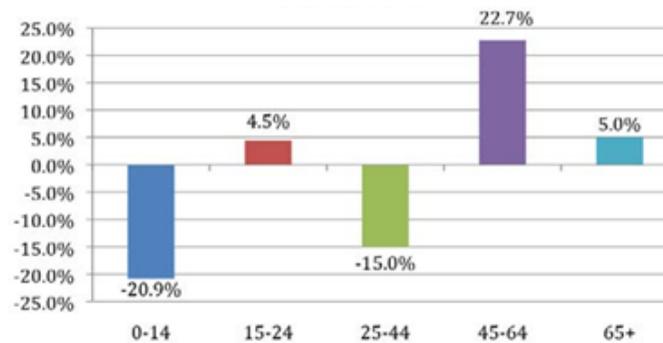
Meanwhile, the Southern Tier workforce is losing workers from both ends of the age spectrum. Well educated young people appear to be leaving in search of better employment opportunities, while retirements are occurring at an increased rate. If these trends are not reversed, in the next 10 to 15 years the Southern Tier workforce is heading toward a shortage of workers, especially if the Region does not find ways to attract and retain younger workers and families. Creating dynamic communities where families can live and work, and where affordable, efficient housing and a quality education for their children is available, is one strategy to help reverse this trend.

The State of Housing

The existing housing stock is predominately single-family units built at least 50 years ago. The age of housing directly correlates with a need for significant repairs, and often these necessary upgrades are never made. It is not uncommon for a house valued at \$70,000 to be in need of \$60,000 of repairs to achieve compliance with building codes, particularly if there is a need to remediate lead-based paint and asbestos.

The mix of housing types in the Southern Tier includes 67 percent single-family homes and 33 percent multifamily units. Manufactured housing, or mobile homes, comprises 20 percent of the housing stock in some counties. In many areas, manufactured housing is the only affordable housing option for many. Like other Southern Tier housing types, manufactured housing is in need of significant repairs; these repairs can be difficult to fund through traditional rehabilitation and retrofit programs, as both NYS and Federally funded programs often exclude manufactured housing from eligibility. Housing in the Southern Tier is generally considered

FIGURE 16 ■ Southern Tier Population Trends by Age Cohort, 2000-2010, Percent Change



“In the Southern Tier in general, housing stock is aging, vacancy rates are high, available commercial space is in need of repair and upgrade, and many historic downtown areas and main streets have fallen into disrepair. The flood of 2011 added to those challenges in the eastern and central regions of the Southern Tier, damaging more than 11,000 residents (sic) and 1,500 businesses.”⁶⁹

⁶⁹ Regional Economic Development Council of the Southern Tier Strategic Economic Development Plan

affordable,⁷⁰ compared to the rest of the State, and slightly more affordable than the national average. However, almost half of all renters and 20 percent of homeowners live in units considered to be unaffordable by conventional affordability definitions, where occupants spend more than 30 percent of their income on housing costs. This effect may be due to a systemic lack of small units; renters are therefore forced to pay for more “home” than they need.

Residents with limited means can have difficulty finding housing in live-work communities and this has placed an extra burden of long commutes on them. In addition, households earning less than 60 percent of the area median income have the greatest challenges finding adequate affordable housing. Based on 2011 data for the eight Southern Tier counties, 42 percent of households are currently considered low-to-moderate-income households; this estimate is projected to hold steady or to increase. An example of a serious affordability crunch is in Tompkins County, where an estimated 30 percent of the workforce commutes in from other counties due to its higher housing costs, and nearly 20 percent of Section 8 voucher-holders are unable to find housing in the City of Ithaca.⁷¹

Land Use and Infrastructure

The revitalization and preservation of main streets and downtown communities across the Southern Tier is hindered by anemic economic growth. Economic growth is needed to create demand for commercial and residential space that can spur revitalization of downtown areas. Binghamton and Elmira, two of the Region’s largest population centers, have both experienced a “hollowing of the core,” that is, population decline in the central city as surrounding suburbs grow. This phenomenon of outward spread presents significant challenges to the strategy of encouraging development around the historic downtown areas of Southern Tier cities and towns. The NYS Smart Growth Public Infrastructure Policy Act of 2010 may help slow this trend.

Smart growth and other land use policies are the foundation for livable communities, and help avoid sprawling housing development and unnecessary extension of costly infrastructure like roads, water, and sewer lines. The alternative is to continue to allow scattershot growth to occur at random because there is a perceived need for any economic development. This approach has had a destructive effect on the existing cities and villages of the Southern Tier. Local governments have strong tools to address this issue, more so than either Federal, State or County government: land use regulations, primarily zoning ordinances and subdivision regulations. However, local leadership, especially in rural areas, is often confronted with property rights arguments and threats of lawsuits when more progressive planning policies are proposed.

Providing multiple transportation options to residents is a key component to reduce energy resources devoted to transportation, and land use patterns, community design, and density play an important role in providing more transportation choice. For example, connected sidewalks, bike paths and racks, safe crossings, pedestrian bridges, and other improvements can be made to improve bike and pedestrian accessibility to key destinations. In order to make bus or streetcar service a viable transportation option, development must occur in more compact patterns than those currently seen in most areas of the Southern Tier. A minimum of six to seven housing units per acre is needed to support regular transit service, with 13 to 16 units per acre required for more frequent service.

New York’s Smart Growth Public Infrastructure Policy Act of 2010 requires most state agencies and all state authorities, prior to approving or funding any public infrastructure project, to file a Smart Growth Impact Statement finding that the project is consistent with ten Smart Growth Criteria or justifying why it is not practicable to do so. The covered projects include transportation, sewer and waste water treatment, water, education, housing and other publicly supported infrastructure.

⁷⁰ According to the U.S. Department of Housing and Urban Development, “The generally accepted definition of affordability is for a household to pay no more than 30 percent of its annual income on housing. Families who pay more than 30 percent of their income for housing are considered cost burdened and may have difficulty affording [other] necessities.

⁷¹ Source: <http://www.nyshcr.org/Publications/HousingNeedsStudy/SouthernTier.pdf>

Two examples of work being done at the county level are examples of the first steps on the path of enhancing livable communities in the Region. Broome County's *Plan for Sustainable Economic Development* includes a regional planning analysis identifying 14 potential development sites in the Binghamton area and ranks them based on site readiness, public cost to develop, and community and regional benefit. This reflects the County's intention to concentrate development where it can bring the biggest benefit at the lowest possible public cost. Tompkins County, in its *Building Vibrant Communities* report, identifies 16 "Development Focus Areas" including an urban center, historic villages, and rural hamlets for future targeted growth through higher design standards, amended land use regulations, and public investments in infrastructure, transit, pedestrian, and bike connections. Locating new employment opportunities in proximity to population centers, existing employment centers, community services, and transit will greatly improve the economic vitality, sustainability, and livability of the Region.

Other examples of plans and initiatives emphasizing the importance of supporting and enhancing livable communities are:

- **Binghamton Sustainable Development & Smart Growth Report.** This report was generated by the Binghamton Commission on Sustainable Growth and makes policy recommendations to improve smart growth.
- **Tioga County Strategic Plan (2010)** has a housing goal to develop a coordinated housing approach that incorporates smart growth principles.
- **Norwich Comprehensive Plan (2003)** calls out a goal for maintaining a Vibrant Downtown as well as highlighting it as a Standout City of Character, Architecture, and History: "Norwich will celebrate and protect historic and environmental resources including its waterways, urban forest, picturesque natural setting, and historic buildings. These offer some of the community's greatest competitive advantages. They must be cherished, protected, and enhanced."
- **Ithaca Neighborhood Greenways Plan (2011)** outlines the need for and potential use of "neighborhood greenways" to improve non-motorized transportation in downtown Ithaca, particularly along six corridors.
- **Cayuga Lake Waterfront Trail.** A partnership of the Tompkins County Chamber of Commerce Foundation and the City of Ithaca, this six-mile multi-use trail will provide an active, non-motorized transportation and recreation way connecting several of Ithaca's waterfront destinations, support a sustainable transportation system, and contribute to the revitalization of Ithaca's waterfront.
- **Four Rivers: An Inter-municipal Waterfront Public Access Plan for Broome County (2011).** This riverfront plan includes goals to use riverfront development to revitalize small "downtowns" and to encourage all riverfront communities to embrace regionalism and development as part of a larger Riverway corridor.

Issues and Opportunities

Issues

Although some main street areas in Southern Tier cities, villages, and hamlets continue to thrive, others are facing significant vacancy issues and a loss of the core downtown population. Housing is in need of significant repairs and upgrades. Creating affordable housing for all income levels in efficient locations can maximize the value of existing infrastructure and allow households to save on transportation costs while reducing environmental impacts. Transforming existing historic downtowns into vibrant areas through place-making initiatives and mixed-use development will be important for both economic growth and creating livable communities that retain residents and workers. Improvements in main streets and downtown areas can be costly, which can be a challenge for communities in the Region that are facing reduced population and property values. In addition, many cities and villages in the Southern Tier have land use regulations and processes in place that facilitate suburban-style development while making it difficult to build to historic neighborhood standards, effectively discouraging development and redevelopment at the densities needed to support revitalized downtown and main street districts. Many municipalities do not have planning staff, and technical assistance

resources are limited. Training provided by the regional planning agencies can share successes and lessons learned among municipal planners, developers, and elected officials. Additional technical assistance and extensive public, business, and developer input can help municipalities in the Region update comprehensive plans and create neighborhood revitalization plans. This will help build support for updating zoning, subdivision, and site plan regulations; adopting plans and design guidelines; prioritizing infrastructure investments; and approving innovative development proposals.

Opportunities

Both a challenge and an opportunity is the number of vacant and run-down commercial buildings in downtown areas of the Southern Tier. Similar to the housing stock, these require significant rehabilitation but could be home to future business and housing located in and near existing neighborhoods and service areas. A barrier to success is the lack of sufficient funding to rehabilitate the extensive supply of older commercial properties, especially in the historic downtown areas. These barriers could be addressed by applying for capital to seed revolving loan funds.

Opportunities to support and highlight the historical and architectural assets of the Region abound. Many cities and towns have attractive storefronts and Victorian and Greek Revival style homes that can have a variety of residential and commercial uses. These can serve as a basis for revitalization and draw visitors to the area. Several counties and municipalities have created initiatives to enliven or preserve their downtowns. These plans and related actions need support.

Creating economic activity in vibrant downtowns may help curb outmigration of young people. Multiple private and public/private projects are underway in the City of Ithaca to develop affordable housing units, market rate units, and student housing in a compact downtown. Location-efficient housing development can be promoted through policies and subsidies to encourage growth in existing population centers.

It is clear the Southern Tier needs to find ways to better incorporate affordable housing into existing neighborhoods. By developing inclusive neighborhood and corridor plans that build consensus on the type, density, and appearance of desired housing, retail, infrastructure, parks, and other facilities, the community vision can match identified needs with available land and buildings. The community vision can be incorporated into design guidelines and adopted master plans, or just used to inform developers of the kinds of designs the community desires. Thoughtful design and a wide variety of construction practices have been successfully used in other areas to counter local community concerns that often accompany proposals for affordable housing development. Buildings following historic patterns, compact cottage neighborhoods, and small ‘granny flats’ or converted garages and basements are other ways of incorporating affordable housing into existing neighborhoods.

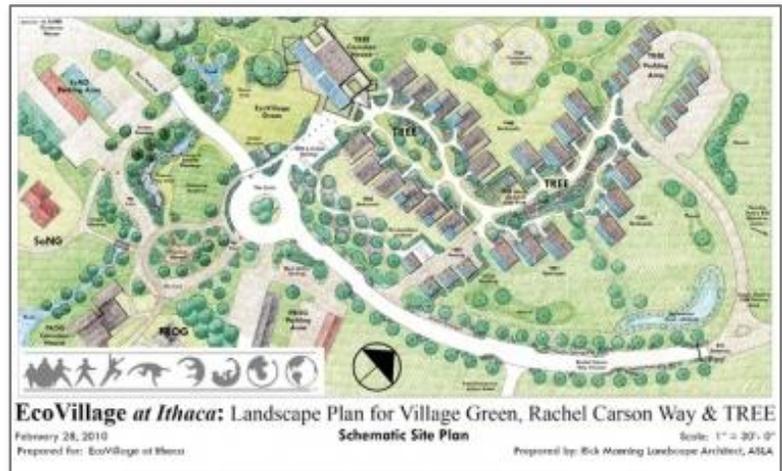
Priority Actions identified for livable communities and land use were derived from successful and innovative programs such as:

- **World War Memorial Library Project.** This 1897 historic landmark is being redeveloped two blocks from Corning’s downtown utilizing NYS Economic Development funds and both State and Federal Historic Preservation Tax Credits. The redevelopment will provide five apartments on four floors.
- **Downtown Ithaca Commons Redevelopment Project** will include fully renovated infrastructure, potentially including a district energy system, beneath the Commons, a redesigned public space and shopping area, and improvements to some commercial buildings all adjacent to regional transit hubs.
- **Breckenridge Place,** a development that is a result of a partnership between Ithaca Neighborhood Housing Services and the PathStone Corporation, will be a 50-unit affordable housing building in downtown Ithaca. The building will provide location-efficient housing to many households in need and is being constructed using numerous energy-efficiency measures that will reduce energy costs for residents.

A Southern Tier Example

Climate Showcase Communities Project – Tompkins County⁷²

Three sustainable pilot communities in Tompkins County will provide models for sustainable living and help reduce emissions in the County. The County is using lessons learned from the award-winning EcoVillage at Ithaca (EVI) and partnering with the EVI Center for Sustainability Education (CSE) on a U.S. Environmental Protection Agency *Climate Showcase Communities* project to update, document, and package EVI best practices for widespread use. EcoVillages typically have innovative site designs that promote sustainable living with energy efficient homes, walkable neighborhoods, and other environmentally-friendly, healthy, and economically sound solutions including on-site food production and decreased reliance on the automobile. This project will yield new model building codes, policies, and zoning ordinances to support sustainable development practices and apply these principles in three different settings as pilot projects. To date Tompkins County and EVI-CSE have finalized a draft model zoning code and completed a report documenting the best practices, challenges, and lessons learned over the past 20 years of developing EcoVillage.



The first pilot project is under construction within the established EcoVillage at Ithaca co-housing community just outside of the City of Ithaca. This is EcoVillage's third neighborhood, known as TREE, which has a target of emitting 80 percent fewer GHG emissions than typical American homes. TREE is adjacent to the first two EVI neighborhoods and will add a common green for community use. Each of the 39 committed households invested 20 percent of the estimated house construction cost, which paid for pre-construction and initial site costs. At least half of the units will be Passiv Haus certified, the largest collection of such units in the United States. TREE has also signed a contract with Buffalo-based Solar Liberty to lease a 50kW ground-mounted solar array for the TREE four-story Sustainable Living Center. Most TREE households will be tracking heat, electricity, and water usage on a quarterly basis.

The second pilot project, the Aurora Pocket Neighborhood, is also under construction and will demonstrate sustainable development practices in a classic urban neighborhood infill site. Aurora Pocket Neighborhood will be a cooperative community of four homes in downtown Ithaca's Fall Creek neighborhood. The homes are being developed on one lot, will share a common garden and storage areas, and, based on high energy efficiency construction methods and materials, will produce 80 percent fewer GHG emissions than most American homes.

The third pilot project will promote development of a densely clustered, walkable neighborhood on 26 acres of County-owned land adjacent to Cayuga Medical Center, the community hospital. Still under concept development, the project will create a compact, walkable neighborhood of 70 homes, while maintaining open space, including a community garden and natural area, and providing an easy walk to public transportation and community services. Tompkins County issued a Request for Proposals in the Fall of 2012 to develop this parcel of land using standards in a model pedestrian neighborhood zone. These standards are derived from the best practices, challenges, and lessons learned over the past 20 years of developing EcoVillage at Ithaca.

⁷² <http://ecovillageithaca.org/treenew/>; <http://ecovillageithaca.org/evi/>

The emissions reduction benefits in these pilot projects are clear. It is estimated that the direct GHG benefits will amount to 475 MTCO₂e annually and generate energy cost savings of \$169,834 annually. The new communities will also provide social and health benefits to residents. Creating spaces that are compact, connected, and easily accessible by foot, bicycle, or public transportation encourages people to drive less when going to work, buying groceries, or visiting neighbors. In walkable neighborhoods, getting around becomes less stressful, healthier, and more fun.

Strategy for the Future

Goals

5. **Strengthen and revitalize existing cities, villages, and hamlets.**
6. **Support development of housing that is energy and location efficient and offers choices to reflect changing demographics.**

These two goals were selected for Land Use and Livable Communities in recognition of the fact that the Southern Tier has a proud history of thriving cities, villages and hamlets that provide a robust framework upon which to build economic development and strong communities. A focus on developing within existing cities, villages and hamlets is more efficient and affordable, reduces pressure to develop on farmland and important natural areas, and can reduce traffic, supporting many of the other goals identified in this Plan.

Indicators and Targets

Two of the indicators (residents living in cities and villages and per capita land consumption) will help track progress on strengthening cities, villages and hamlet. The third indicator (affordable housing units in cities and villages) will track progress toward the goal of supporting housing development that is energy and location efficient. Data are available to track progress for all three indicators. Nine priority actions were identified through the Cleaner Greener Southern Tier planning process to support livable communities and help achieve the targets shown in the accompanying box, based on technical analysis, stakeholder support, feasibility, and greatest GHG reduction potential.

In order to increase the proportion of residents that choose to live in existing cities and villages, a number of concerns must be addressed. There must be an adequate supply of housing, appropriately priced; the communities must be attractive places to live, with a variety of services, shops, and other opportunities. The proposed actions address these concerns, either directly (e.g., by providing a funding mechanism to support the construction of new and rehabilitation of existing housing) or indirectly through local government policies (e.g., by promoting development at densities that will support a mix of businesses within communities). In order to quantify the greenhouse gas emissions reductions that may be expected, assumptions were made about the anticipated implementation of each action over the next 20 years. By 2032, the Southern Tier can expect to reduce GHG emissions by 83,000 MTCO₂e by implementing these actions. This

INDICATORS

Proportion of Southern Tier residents who live in existing cities and villages.

Baseline (2010)

38% of Southern Tier residents live in existing cities and villages

Targets

- Long Term (20 year): 45% (7% increase over 20 years)
- Short Term (5 year): 40% (2% increase over 5 years)

Land Use Patterns – per capita land consumption

Baseline (2010)⁷³

0.10 acres per capita

Percentage of housing units located within cities and villages that are affordable to low-to-moderate-income households.

Baseline (2010)

37% of the housing units

Targets

- Long Term (20 year): 42%
- Short Term (5 year): 38%

⁷³ For the purposes of determining land consumption, the following NLCD Land Cover Classes were included: Developed, Low Intensity; Developed, Medium Intensity; and Developed, High Intensity.

represents a 22 percent reduction in emissions from 2010 levels in the livability sector, and a one percent reduction in the overall GHG emissions for the Region. All of these priority actions will need to be implemented to achieve these goals and targets over the Plan’s 20-year timeline; other supporting actions can be found in the Supplemental Actions list in the Appendix.

Taking Action

The following nine actions were determined to be the most important livability-related actions for the Region to focus on. The assumptions used to calculate GHG reduction potential, and the expected GHG reduction for each relevant action, are detailed in the Implementation Strategy in the Appendix. Some actions are also related to the REDC Strategy; these are also noted in the Implementation Strategy. There is also more detail about the actions marked **TOP 22** at the beginning of this Plan.

▶ **TOP 22** 19. Encourage development and strategic investment in cities, villages, and hamlets

Goal Supported: 5

Description: Many Southern Tier cities, villages, and hamlets were built more than a century ago to meet the needs of a mostly pedestrian population. These communities have downtown and main street areas that were built before automobile travel. The Southern Tier’s six cities and 59 villages mostly have historic Main Streets and commercial districts adjacent to compact neighborhoods. These communities have two key ingredients necessary to support a livable community: walkable centers and a mix of land uses.

Binghamton Downtown, Inc. surveyed County residents to determine why people visit downtown, what improvements they would like to see, and what currently prevented them from enjoying downtown Binghamton. The survey showed significant interest in walking trails and more outdoor cafes, as well as the draw of events at downtown venues.

Developing in existing population centers capitalizes on existing public and private investments in water and sewer infrastructure; streets, sidewalks and highways; and houses, businesses, schools, and services. Revitalization of downtowns and main streets will have a direct impact on expanding economic opportunities. Enhancing core areas helps support new housing and economic opportunities and expanded transit, walking, biking, and carpooling choices. Cost savings are key benefits to developing and investing in cities, villages, and hamlets. Developers may save as the cost of developing housing, on a per unit basis, can be significantly less than in rural and suburban areas. Residents of downtowns and main street areas also spend less than their rural counterparts on transportation. In addition, this strategy will support reduction of public costs to taxpayers, as the cost of maintaining infrastructure in a relatively smaller area is spread over more customers in densely developed areas. Implementing this action may yield jobs, particularly in the construction and transportation sectors. Capital improvements can be costly, which can be a challenge for communities facing reduced population and property values. Analysis and education to show the value and cost-effectiveness of initial investments over time can lead to strategic public investment decisions that maximize the value of private development. This will help build support for targeted infrastructure investments and approval of innovative development proposals.

Potential Leads: The principal leads will be local government officials and local and regional planning staff.

▶ 20. Provide gap financing for community revitalization projects

First proposed in the Southern Tier Regional Economic Development Council’s Strategic Plan

Goal Supported: 5

Description: This action will support implementation of the Southern Tier Community Revitalization Project, as identified in the REDC Plan. It will provide “gap financing” for private sector redevelopment of key buildings, infill of new buildings, and development of the Region’s downtowns, neighborhoods and rural population centers, which will particularly benefit those communities damaged by recent floods. The project

will allow each community to identify its own place-based priorities, and to structure projects to support unique local needs in targeted areas (near transit, schools, historic centers) and places that are supported by local comprehensive plans. Examples include student housing in downtown Binghamton, the Windsor Whip Factory redevelopment, and redevelopment projects in downtown Ithaca. The objective is to use both state and federal public investments as secondary financing tools for specific downtown and community neighborhood revitalization projects. Projects will need to have a financing strategy and demonstrate the greatest potential to leverage public funds and non-profit resources, attract and sustain both short-term and long-term private capital, and catalyze further development. Revitalization projects will create quality space for commercial development and entrepreneurial enterprises and additional residential housing options, while building on existing infrastructure and housing stock with upgrades and new construction in keeping with the downtown and neighborhood character. While enhancing the tax base overall, the initiative will recapture the value of neighborhoods with underutilized or deteriorated public assets. It will also respond to recent natural disasters that have severely impacted the sustainability of many downtowns. Infill and mixed-use projects in existing communities are more difficult, and require complex, layered funding structures and additional resources. This fund will meet critical needs to complete the funding package and get well-located, innovative projects built.

Potential Leads: Possible leads for this action include regional economic development agencies and local financial institutions.

▶ 21. Support development in downtown areas at appropriate densities

Goal Supported: 5

Description: Building density in downtown areas helps build vital communities while providing housing options for an aging population and a younger workforce. Additionally, it is more efficient to develop in areas where infrastructure already exists, so it makes economic sense. Currently, the Tompkins County Industrial Development Agency (IDA) and the City of Ithaca are streamlining the city's downtown density incentive policy. Under the existing policy, the IDA has provided incentives to six downtown projects, which have invested \$71 million and added 477,450 square feet of retail, commercial, office, and residential space. The revised policy will make it easier for companies to take advantage of this incentive and provide economic benefits to the city. Implementing density incentives throughout the Region could improve the local business environment and attract businesses and residents into urban centers. Since there can be neighborhood objections to increasing density, any density incentive policies should be developed with significant public input, and tied to community-based plans and design guidelines so that residents can be assured the development is aligned with the community's vision.

Potential Leads: Possible leads for this action include regional planning agencies, municipalities and industrial development agencies.

▶ 22. Support redevelopment of strategic sites and vacant properties

Goal Supported: 5

Description: The Southern Tier Community Revitalization Project, discussed above, is intended to fund projects that use coordinated partnerships to provide improved and diverse downtowns with housing, commercial, and retail opportunities, and public spaces to enhance neighborhoods. For vacant and brownfield sites in downtowns, design standards and "development-ready" improvements can enhance properties and decrease the negative impacts they have on the surrounding community. Even temporary site improvements such as fences, signs, landscaping or artistic installations can enhance the appearance of vacant properties while alerting the community that they may be available for development. Cities and villages can also work with developers to address potential contamination and liability issues to incentivize development. The redevelopment of these strategic sites can result in job creation and poverty reduction. Planning for multiple sites in a single neighborhood can have more impact; examples include the City of Binghamton's First Ward neighborhood Brownfield Opportunity Area (BOA) and the North Chenango Corridor BOA. Since even potential contamination can inhibit developer investment, demonstrating clear

public and neighborhood support for revitalization of strategic sites can encourage developer interest, and make it worth undertaking environmental and feasibility analysis.

Potential Leads: Possible leads for this action include regional planning agencies, municipalities and industrial development agencies.

▶ **TOP 22** 23. Update local land use regulations and design codes and provide technical assistance to implement projects

Goals Supported: 5 and 6

Description: Livable communities are compact and walkable places with mixed-use neighborhoods offering a variety of housing types, commercial and community services, employment opportunities, and transportation choices. Updates to land use and development regulations are critical for focusing future growth in priority development areas to support livable communities. Creating an updated set of codes that is easy to use and understand and provides clear direction to developers about community needs and desires can reduce concerns about potential impacts of development. Southern Tier villages and hamlets often have limited access to planning and implementation resources to update their codes. There are many successful examples of small communities around the country using updated land use regulations and other programs to support desired development patterns. Form-based codes, smart design standards, and transit-ready street improvements will make the Region's villages and hamlets more walkable, livable, and ultimately sustainable. Southern Tier governments and agencies can develop a technical assistance program and toolkit of resources that consider and incorporate the unique architectural characteristics, culture, and history of the communities in the Region. With multi-jurisdictional collaboration and pooled resources, the Southern Tier can promote walkable land use patterns in hamlets and villages and enhance economic competitiveness. While most communities in the Southern Tier have developed comprehensive plans, some of these are out of date and others fail to provide a broad vision of how priority areas should be developed. In addition, Southern Tier villages and hamlets often have limited access to planning staff and implementation resources to update their codes. These barriers can be addressed by assisting municipalities to hire experts to develop plans and regulations, creating stronger connections between rural municipalities and planning schools in the Region to encourage class projects assisting municipalities, and regional planning agencies' sharing regulatory models and codes, as well as lessons learned, among municipalities in the Region.

Potential Leads: The principal leads will be local government officials, both elected and appointed, and local and regional planning staff.

▶ 24. Assess affordable housing needs and identify target areas for rehabilitation and new construction

Goals Supported: 5 and 6

Description: This action would develop a strategic needs assessment for housing rehabilitation and new construction, at either the county or regional level. Mapping existing housing needs and identifying key data, including age of housing stock, household income, occupancy, overcrowding, severe housing conditions, and type of housing, can help identify target areas. Once these elements are mapped, clusters may emerge of low-income communities with substandard housing. These clusters can then be evaluated against planning criteria (e.g., priority city, village, and hamlet development areas, transit service and basic infrastructure) so that investment in these units corresponds to the community's overall planning objectives. Calculating the long-term household savings from energy- and location-efficiency may also be important in order to underscore the need for these elements in housing development. Nearly half of all Southern Tier renters and over 20 percent of homeowners spend more than 30 percent of their income on

The development of energy-efficient affordable housing at Breckenridge Place in downtown Ithaca exemplifies key livability principles. The development will be LEED-certified, adjacent to transit, and affordable to Ithaca residents with a wide range of incomes.

housing, but the specific needs in each community across the region are not well-documented. Completing the needs assessment will provide the information needed to target limited resources.

Potential Leads: Possible leads for this action include regional planning agencies, county planning departments, and affordable housing advocates and providers in the Region.

▶ **TOP 22 25. Provide financial and technical assistance to rehabilitate housing for low-to-moderate-income households**

Goal Supported: 6

Description: The housing stock in the Southern Tier is aging. Nearly 60 percent of all housing units were built before 1960, which means that they were constructed before building codes that take energy efficiency considerations into account were commonly implemented and enforced. Not surprisingly, many of these units need significant repairs and upgrades to bring them up to code, and even more investment is required to enhance their energy efficiency.

Many low- and moderate-income households lack the funds needed to enhance their homes' energy efficiency, yet would benefit significantly from reduced energy costs that will result from these energy efficiency upgrades. This action focuses on the rehabilitation of small single-family homes, manufactured housing, and 2-4-unit multifamily properties. Subsidy programs for these upgrades should have clearly stated, overarching goals such as reducing energy consumption by a specific percentage or rehabilitating a certain number of units to a specific standard, and should be flexible enough to accommodate a variety of eligible types of housing, rehabilitation activities, and construction materials. These actions will not only alleviate challenges associated with housing and energy cost affordability, but will also help to address regional concerns about vacancy and abandonment of housing units.

The most important part of this action is to invest in technical assistance programs that provide resources to low- to moderate-income households, particularly households living in small homes, manufactured housing, and 2-4 unit multifamily properties. Enhanced building code enforcement for rental properties, which are more likely to be occupied by low-to-moderate-income households, may be necessary to provide an incentive for landlords to ensure that their properties are in compliance and safe for renters. Barriers include lack of sufficient funding to rehabilitate the extensive supply of older housing and the fact that manufactured housing units are often not eligible for subsidy programs that will help finance energy efficiency improvements. These barriers could be addressed by applying for capital to seed a revolving loan fund, grants to assist low- to moderate-income households in weatherization and code and safety improvements, and concentrating weatherization/rehabilitation resources on approved housing types while working to create innovative financing mechanisms to rehabilitate manufactured housing.

Potential Leads: Potential leads include local municipalities and housing agencies, with support from regional and state agencies.

▶ **26. Remove barriers to converting upper floors to residential uses in city and village downtowns**

Goals Supported: 5 and 6

Description: There are numerous economic, social, and environmental reasons for promoting a mix of uses, like conversion of upper-floor areas to residential uses, in existing downtown buildings. These include supporting local businesses that have suffered the negative effects of flight from downtowns; increasing activity in the downtown during evening hours; expanding housing options for seniors looking to downsize; supporting demand from the Gen Y demographic that prefers well-located units; and promoting transit-oriented land use. Review of several Southern Tier zoning laws and NY State housing agency reports have confirmed that amendments to current zoning codes will need to be passed in many communities to allow for mixed-use development, including for apartments or live/work units above commercial buildings. Converted upper floors should be available at all price/housing levels, from affordable to luxury. Changes to statewide regulations may also be needed to remove barriers to infill development and allow flexibility in mixed-use development through the amendment and relaxation of outdated codes. Revisions to state building codes in New Jersey and Maryland allowed more flexible interpretation of renovations to historic buildings, which led to increased redevelopment of historic properties in the first year by up to 60 percent.

One local example is that existing buildings in Binghamton are exempt from parking requirements if they are being rehabilitated. Most localities may not have available staff or expertise for this codes review, or the resources to pay for it. This can be addressed when implementing Action 23, by developing templates and model code language for small, mid-sized, and large communities.

Potential Leads: Lead agencies will be local government officials, both elected and appointed, and local and regional planning staff.

▶ **TOP 22** 27. Provide technical assistance and gap financing for construction and rehabilitation of new energy-efficient affordable housing

Goal Supported: 6

Description: Nearly half of all renters and over 20 percent of homeowners spend more than 30 percent of their income on housing costs, and thus do not live in housing that is considered affordable. In addition to high housing costs, heating and energy use is also a significant expenditure for many households. This action aims to engage developers and property owners to invest in rehabilitating existing affordable housing to improve energy efficiency and to construct new, energy-efficient affordable housing to meet the Region's housing needs and energy goals, using technical assistance and financing opportunities. The rehabilitation and development of energy efficient housing will significantly reduce households' energy bills as energy consumption is reduced. In turn, this will reduce the Region's overall building energy usage. In the Southern Tier, 28 percent of all energy consumed is from residential buildings, so any savings in this area will have significant effects. Furthermore, locating housing in priority development areas will improve residents' accessibility to less energy-intensive forms of transportation (i.e. transit, walking, and biking) and reduce the need for driving trips, which can be very long in some parts of the Southern Tier. Because residents often travel by single-occupancy vehicle, reducing trips can also significantly reduce GHG emissions per capita. Overall, the limited available funding as compared to needs is the largest barrier. The Southern Tier has strong local knowledge and experience in developing affordable housing and implementing energy efficiency programs, but these areas have not yet been fully aligned. Establishing a revolving loan pool of flexible funding to provide gap financing and energy system upgrades on major projects would help overcome these barriers, as well as provide better coordination and information sharing among housing and weatherization agencies.

EcoVillage at Ithaca, an EPA Climate Showcase Community, is a successful demonstration project in the process of constructing a new energy-efficient residential neighborhood. EcoVillage uses 40 percent fewer resources than the typical American community. Each of the 72 new housing units is expected to achieve an 80 percent reduction in GHG emissions.

Potential Leads: Leaders for this action include local governments, housing agencies, private and non-profit housing developers, and weatherization agencies.

ECONOMIC DEVELOPMENT

Historically, agricultural production and manufacturing were the foundation of the Southern Tier economy. Manufacturing has been a primary economic driver since the early 1900's. While the number of jobs in the manufacturing sector has declined for the past 50 years, the Southern Tier continues to rank highest among New York State's ten regions in proportion of jobs in manufacturing. Agriculture constitutes only a small percentage of today's jobs, yet retains its importance as the foundation of the rural economy and a dominant land use. In recent decades, the economy has shifted towards service industries.

To strengthen its economy, the Southern Tier needs to exploit its competitive advantages – a strong manufacturing base with growth in clean energy and innovative industries, premiere academic institutions, a growing healthcare sector, and an extensive natural resource base.

Three economic development goals were identified to trigger sustainable economic growth for the Southern Tier:

- 7. Create and retain more good paying jobs by building on the Southern Tier's regional strengths, including advanced energy and transportation technologies, globally-competitive industry, and workforce development and technology transfer partnerships with educational institutions.**
- 8. Support farming and related businesses to reinvigorate the rural economy, enhance residents' incomes and standards of living, and promote local food and agriculture.**
- 9. Support tourism industry development with coordinated marketing, preservation, and enhancement of historic, cultural, educational, and natural resources and events.**

Snapshot of the Region Today

Workforce

The Region's active workforce is composed of just over 320,000 people. There has been a drop in the size of the workforce in recent years, coinciding with a decreasing population and workforce trends throughout rural America. The workforce reached a decade-long low point in July 2011.⁷⁴ Workforce development should be a clear priority in the near term. Employers are facing a lack of both highly skilled workers and workforce-ready unskilled labor.

An aging population, together with a level of educational attainment that lags significantly behind the state, gives the Southern Tier complex challenges to overcome to maintain and foster development of a competitive workforce. However, educational attainment levels vary significantly across the eight-county Region with increased educational attainment near the universities and major manufacturing centers. For example, Tompkins County is noted as having one of the highest levels of doctoral degrees completed in the nation.

The four largest economic sectors in terms of employment – government, healthcare and social services, retail trade, and manufacturing – account for roughly half of all jobs in the Region. The accommodation and food services sector (comprising much of the tourism sector) and the private education services industry, together employ roughly an eighth of the Region's employees.

TABLE 14 ■ Educational Attainment: Persons 25 years of age and older

Highest Level of Educational Attainment	Southern Tier	NYS	USA
High School Degree or Equivalent	34.1%	27.7%	28.5%
Bachelor's Degree or Higher	25.1%	32.5%	28.2%
Graduate Degree	11.9%	14.0%	10.4%

Source: U.S. Census Bureau, 2006-2010 American Community Survey 5 Year Estimates

⁷⁴ "Strategic Economic Development Plan: 2011-2016." Regional Economic Development Council of the Southern Tier, 2011, p. 52.

Growth Sectors

When considering the Southern Tier economy of the future, industries poised and projected for growth include healthcare, biotechnology, and life sciences; public and private education; manufacturing; and tourism.

Healthcare.

The Southern Tier’s healthcare industry is the second largest employer and the fastest growing segment of the economy. In 2011, private hospitals employed 11,798 people, a number expected to increase by about five percent by 2021.⁷⁵ The private hospital sector and related sectors of life sciences and biotechnology research are expected to grow in both the short and long terms.

FIGURE 17 ■ Jobs by Sector

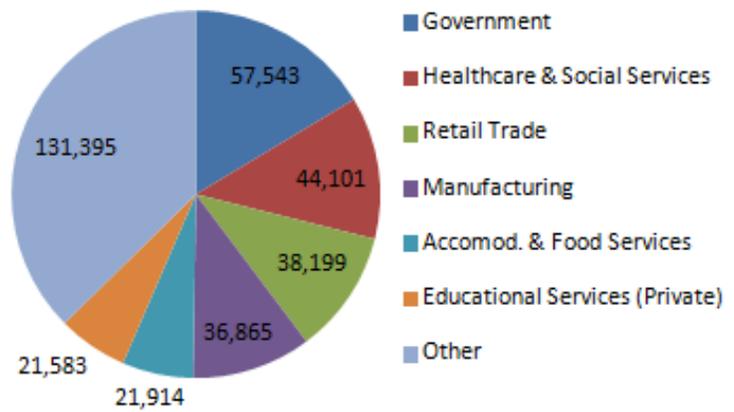


TABLE 15 ■ Largest Employers in Southern Tier

Employer	Principal Location	Approx. No. of Jobs
Cornell University	Ithaca	9,500
Corning Incorporated	Corning	5,400
Binghamton University	Vestal	5,500
United Health Services	Binghamton	5,400
Lockheed Martin	Owego	2,800
Broome County Government	Binghamton	2,500
Lourdes Hospital	Binghamton	2,300
Arnot Hospital	Elmira	2,000
New York State (in Binghamton)	Binghamton	2,000

Education. Educational employment is relatively stable and likely to grow in the near future. The Region’s ten institutions of higher education include both public and private colleges and universities. Overall, this industry provides high wages and good benefits packages to its full-time employees.

Manufacturing. Though the manufacturing sector has been declining for the last half century, following successive waves of de-industrialization and globalization, it remains an important segment of the Southern Tier economy. It employed more than 38,000 people in 2011, or 11 percent of the Region’s workforce – more than twice the state average.⁷⁶ However, in the past ten years, the number of jobs declined by a staggering 25 percent. Though this was lower than other manufacturing areas in NYS and nationally, this dealt a serious blow to the heavily manufacturing-based economy.

While manufacturing jobs are projected to decline an additional ten percent in the next decade, several specific manufacturing areas are expected to grow: semiconductors and electronic components, transportation equipment, aerospace products, navigational equipment, ceramics, industrial machinery, and computer

Both new and already-established manufacturers have recently invested in expansions and new factories in the Southern Tier, providing capital and jobs to the Region.

- Impress, Inc. invested \$44 million into a new factory in the Broome County Corporate Park in 2010, which is expected to create 140 new jobs by 2013.¹
- Raymond Inc. has expanded operations at its facility in Greene; the company invested \$46 million and created more than 50 new jobs in addition to the 740 people already employed at the facility.
- World Kitchen has similarly invested \$45 million into its facilities and anticipates creating 60 new jobs to augment its workforce of 450 people.

⁷⁵ Data from Economic Modeling Specialists Int., 2012. <http://www.economicmodeling.com/>

⁷⁶ Data from Economic Modeling Specialists Int., 2012. <http://www.economicmodeling.com/>

equipment. Expansion in these areas is anticipated to create more than 10,000 new highly skilled, high-paying jobs in the next ten years.⁷⁷

TABLE 16 ■ Cash Receipts from Farm Marketings by County (USDA Agricultural Census, 2009)

County	Cash Receipts from All Products (2009)
Broome	\$22,968,000
Chemung	\$12,788,000
Chenango	\$48,890,000
Delaware	\$41,500,000
Schuyler	\$27,830,000
Steuben	\$108,803,000
Tioga	\$27,465,000
Tompkins	\$47,799,000
Southern Tier	\$338,043,000

included in the fastest-growing agricultural regions in New York.⁷⁸ Agriculture sales figures show Steuben County had the largest farm sales, by far – over \$100 million in cash receipts, followed by Chenango County with approximately \$49 million. Since 2009, there has been significant development in existing and new markets, including value-added dairy (yogurt and cheese) and wine. The Region continues to capitalize on the existing local market through resurgence in farmers markets, and is continuing to explore new opportunities in processing and value-added goods.

Tourism. The Southern Tier attracts visitors for its history and natural beauty. Among the Region’s tourist attractions are its historic downtowns and villages; parks, waterways, and natural resources; museums and other educational and civic institutions; and agriculture and other industries. The tourism industry has been an important and steady growth area in the Southern Tier economy. As of 2011, tourism and recreation employed approximately eight percent of the workforce, representing a growth of more than 11 percent since 2001, and is projected to further expand. At its corporate headquarters in Corning, the world-renowned Corning Museum of Glass houses a glassmaking center and museum with over 40,000 objects that represent 3,500 years of glassmaking. The museum is a regional and international destination, providing educational tours and programs. From 2002 to 2012, winery employment increased by 93 percent in Steuben County (98 to 189 jobs) and 62 percent in Schuyler County (95 to 154 jobs). Steuben and Schuyler Counties showed the greatest growth and overall employment in the Southern Tier winery industry.⁷⁹



Agriculture. The Southern Tier has extensive natural resources and agricultural land uses, including more than a million acres of farmland and 5,733 active farms in the Region. However, due to modern farming practices, agriculture is no longer a significant employment sector and now accounts for just two percent of all jobs. Many of these are seasonal and filled by migrant labor.

Nonetheless, agriculture plays an important role as the foundation of the rural economy and a dominant land use. Five of the eight counties in the Southern Tier are

Economy and Greenhouse Gas Emissions

To consider the Southern Tier economy’s impact on GHG emissions holistically, it is necessary to contemplate the life cycle of industrial processes and product development; commuting patterns of employees and product transport; business facility and energy consumption; and waste generated from all of the above. For purposes of this section, the commercial and industrial energy emissions are evaluated with regard to indirect (Scope 2) emissions associated with electricity consumption, direct (Scope 1) emissions associated with fuel consumption,

⁷⁷ Data from Economic Modeling Specialists Int., 2012. <http://www.economicmodeling.com/>

⁷⁸ Regional Economic Development Council of the Southern Tier, 2011, *Strategic Economic Development Plan: 2011-2016*, p. 88.

⁷⁹ EMSI, 2012

and non-energy industrial process-related emissions. GHG emissions from commercial and industrial sources are shown Table 14 below.

Emissions from commercial energy consumption are comparable to the nation as a whole, with emissions representing 14 percent of the regional total versus 15 percent of the national total. In the industrial sector there is more of a difference due to the relatively low levels of industrial activity in the region: emissions from industrial energy consumption accounted for 13 percent of the region's emissions, versus 20 percent for the United States, while industrial process emissions account for three percent of the region's emissions, versus four percent for the nation.

TABLE 17 ■ Commercial and Industrial Energy Consumption

	Scope	GHG Emissions (MTCO ₂ e)	Percent of Gross Emissions
Commercial Energy Consumption		1,333,059	14%
<i>Electricity</i>	2	552,146	6%
<i>Fuels</i>	1	780,913	8%
Industrial Consumption		1,271,887	13%
<i>Electricity</i>	2	392,108	4%
<i>Fuels</i>	1	879,779	9%
Industrial Processes	1	268,581	3%

Issues and Opportunities

Issues

The declining population of the Southern Tier is undergoing significant demographic changes. The Region is aging at a greater rate than the national and state averages and the younger segment of the workforce is migrating out, lured by the promise of employment opportunities and higher wages elsewhere. Over the last decade, the labor force has contracted by 4,500 workers. However, demographers expect the population to stabilize by 2045; with equal numbers of young, middle-aged, and older residents.

Employers are facing a lack of both highly skilled workers and workforce-ready unskilled labor. Employers need workers with basic literacy and job skills training. Some high-tech employers need workers with higher levels of education; however, only a quarter of the Region's population currently holds a college degree. Southern Tier jobs provide lower than average wages, approximately \$39,000 annually, or \$20,000 less than the State average and \$6,000 less than the national average.⁸⁰ Low-wage employment prospects do not typically attract young talent, though the low cost of living in the Region may offset the wage rate somewhat.

Aging infrastructure is a problem throughout the area; urbanized areas are dealing with up to 100-year old water and sewer systems, 40-year old gas lines, and aging electric networks. Substantial infrastructure improvements will be necessary in the next 25 years to maintain current levels of service. The Region also lacks an identity as a single geographic entity, and therefore as a unified economy. Currently, activities are pursued by multiple actors, sometimes along a parallel course but often not coordinated.

Opportunities

Critical to the economy of the Region is its access to and ability to compete in major markets. The Southern Tier's proximity to major U.S. markets, such as New York City and Boston, by rail and road offer a locational advantage. This may be a linchpin in positioning the Southern Tier as the breadbasket for New York City, to jumpstart significant growth in the agricultural sector. In addition, easy access to these markets offers capability for the quick exchange of knowledge and products.

⁸⁰ Economic Modeling Specialists Intl. EMSI, 2012.

Manufacturing in certain subsectors is projected to be highly competitive, offering wages on par with or exceeding State and national rates. These subsectors are bolstered by nationally-competitive advanced research and manufacturing firms, particularly in areas of semiconductor and electronic components; navigational, measuring, electro-medical, and control instruments; and aerospace products and parts. The Region boasts strength in the fields of education services, healthcare, and tourism and all three of these sectors are projected to grow. The Southern Tier's ten colleges and universities provide leaders in employment and innovation, and attract and retain young talent. Strategic partnerships can position the Region as a center for innovation and attract outside investment.⁸¹

Tourism in the Southern Tier celebrates and builds on the assets inherent to this Region and is growing. The pristine lakes and rivers; historic, bustling main streets; and bucolic rural landscapes are attracting a growing tourist base. A growing demand for locally-grown food, from fresh fruits, vegetables and meat to value-added products such as wine, cheese and yogurt, provides the promise of cultivating a rebirth of the agriculture sector, supporting farmers markets and restaurants that serve local products. The Region can continue to capitalize on the growing local market and explore new opportunities, such as product branding, online information networks, and enhanced distribution. Coordinating with the Cornell University College of Agriculture and Life Sciences (CALS), internationally recognized for its agricultural research and development, may assist in launching new food products, biomass production, and innovative best management techniques.⁸²

Cornell Cooperative Extension of Tompkins County's Buy Local Campaign is a community based initiative that evolved from interest in supporting local agriculture and building a stronger local food system in Tompkins and surrounding counties. Through outreach, marketing, and special initiatives, Buy Local seeks to raise individual and institutional awareness about the benefits of buying fresh locally grown and made products and to make local food an integral part of daily life. Beyond encouraging purchasing of local products, common challenges for local and smaller-scale agricultural producers in the Southern Tier include processing their products in a cost-effective way, competing with industrial-scale producers, and accessing mainstream markets. Overcoming this barrier will require investment in facilities, marketing, production, and enhanced logistics and coordination across hundreds of producers with a range of sizes and needs.

More than 1,000 businesses engage in clean energy activities in Central New York and the Southern Tier.⁸³ For example, although still small, the biomass industry provides a growing income base. These businesses are poised to grow quickly in the right economic and regulatory environment.

The economic development implementation strategy is based on innovative and successful local projects such as:

- **The Broome County Greater Binghamton Innovation Center**, launched in 2011, is a high-tech incubator housing high value startup companies with a mission to promote job creation and economic growth.
- **e2e** is an award-winning company that develops advanced biocomposite materials for furniture and cabinetry. It began at Cornell University and received state financial support to establish a full-scale production facility in Geneva, New York, which is expected to support up to 200 jobs in the next five years.

Recent agricultural efforts and collaborations between Cornell CALS and state and local agencies include:

- improving the Region's \$3.8 billion wine industry which employs 17,000 people;
- a new licensing agreement with the New York Apple Growers, LLC that gives New York growers exclusive rights to new varieties of apples; and
- developing a new maple product that helped to double the value of maple syrup from 2004-2008.

⁸¹ Regional Economic Development Council of the Southern Tier, 2011, *Strategic Economic Development Plan: 2011-2016*, p. 16.

⁸² "Strategic Economic Development Plan: 2011-2016." Regional Economic Development Council of the Southern Tier, 2011, p. 90-91.

⁸³ Regional Economic Development Council of the Southern Tier, 2011, *Strategic Economic Development Plan: 2011-2016*, p. 67.

- **Corning Inc.** is a global Fortune 500 company utilizing its expertise in glassmaking to break into several dynamic markets, including the development of photovoltaics, optical fiber for telecommunications, and LCD displays.
- **The Finger Lakes Wine Country Restaurant Week**, the established Finger Lakes Wine Trail, and emerging and flourishing cheese and brewing trails are successful examples of the Region’s growth as a local food and tourist destination.
- **The Ithaca Farmers Market** is a 30-year old cooperative with 150 vendors who provide products grown or made within 30 miles of Ithaca, New York. This has become a popular regional destination, particularly in the summer months, and serves as a model for local culinary tourism and economic development.

TABLE 18 ■ Aligning the Southern Tier REDC with the Implementation Strategy Actions

REDC Strategy	REDC Action Item	Implementation Strategy Action
Strategy 1. The Southern Tier...New York’s Leader in Energy Efficiency and Renewable Energy Technology.	Southern Tier Renewable Energy and Efficiency Initiative: Residential and Small Scale Commercial Retrofit	1. Promote energy efficiency and renewable energy in residential and commercial buildings
	Southern Tier Renewable Energy and Efficiency Initiative: Large Scale Institutional and Commercial Projects.	1. Promote energy efficiency and renewable energy in residential and commercial buildings
	Energy Workforce Development Initiative	28. Implement the Energy Workforce Development Initiative 29. Identify, train, and certify contractors to meet increased demand for energy efficiency 32. Strengthen university-industry connections to improve and promote workforce development
Strategy 4. Revitalize the Rural Farm- and Forest-based Economy of the Southern Tier	Rural Initiative Venture Fund	35. Support development of processing and distribution facilities (Food Hubs) for local and value-added products 40. Encourage new farm startups and farm transfers to next generation
Strategy 5. Strengthen the Southern Tier’s Economic Development Backbone	Southern Tier Community Revitalization Project	20. Provide gap financing for community revitalization projects
	Shovel Ready Site Development Project	22. Support redevelopment of strategic sites and vacant properties

A Southern Tier Example

Chobani Yogurt – Chenango County⁸⁴

After the closing of a large Kraft yogurt factory in Sherburne, NY, an upstate New York resident from Turkey bought the abandoned space. Between 2005 and 2007, Hamdi Ulukaya worked with local dairy farmers, previously laid-off Kraft employees, and a yogurt master to create Chobani yogurt, sparking the country’s fast-growing Greek yogurt trend. In addition to the available dairy industry knowledge base and milk production, the Region’s plentiful high-quality water resources were a critical factor in creating the brand and expanding the yogurt operation.

In the five years since its 2007 release in several New York groceries, Chobani has become the best-selling yogurt brand in the country, and the company is now valued at \$1.1 billion (Bloomberg). With the company’s largest factory still in Sherburne, the business has brought economic opportunity to the Region. Chobani has 1,200 employees in New York alone and uses more than three million pounds of milk each day. In a Region with a



⁸⁴ http://money.cnn.com/2011/11/29/smallbusiness/chobani_yogurt_hamdi_ulukaya.fortune/index.htm; <http://chobani.com/>

struggling dairy industry, Chobani has vastly increased the demand for milk, and has provided an income for thousands of New Yorkers.

Beyond the direct impacts that Chobani's prosperity has had in Chenango County, the company also donates ten percent of their profits to charities across the country, including many in upstate New York. On the energy front, discussions are underway to evaluate the potential for utilizing the Sherburne plant's waste in an anaerobic digestion process and using the methane produced to fuel a co-generation plant to heat and power the plant, with the added potential for providing electric power to nearby homes.

Strategy for the Future

Goals

7. **Create and retain more good paying jobs by building on the Southern Tier's regional strengths, including advanced energy and transportation technologies, globally-competitive industry, and workforce development and technology transfer partnerships with educational institutions.**
8. **Support tourism industry development with coordinated marketing, preservation, and enhancement of historic, cultural, educational, and natural resources and events.**
9. **Support farming and related businesses to reinvigorate the rural economy, enhance residents' incomes and standards of living, and promote local food and agriculture.**

These three goals were selected for Economic Development in recognition that it is key to build upon the Region's economic strengths of higher education, technology development, manufacturing, tourism, and farming.

Indicators and Targets

Tracking average wages within the region will help gauge progress in creating and retaining good paying jobs. And cash receipts from farm sales is a good way to measure the strength of the agricultural economic sector. Data on average wages are published frequently and information about farm sales receipts is available periodically. Nine priority actions were identified through the Cleaner Greener Southern Tier planning process to achieve sustainable economic development and help achieve the targets shown in the accompanying box, based on technical analysis, stakeholder support, and feasibility.

One set of targets is to bring regional wages in line with national averages. Actions related to workforce development will help to achieve this target by focusing on industries that pay well. For example, the proposal to implement the Energy Workforce Development Initiative as proposed by the Southern Tier REDC was included as clean-tech and other green jobs pay 20 percent higher than the median wage in the U.S. Also, actions proposed related to promoting culinary and agri-tourism, providing more value-added agricultural activities, and promoting the use of local agricultural products will work together to increase farm sales in the Region. All the recommended actions, in conjunction with the work of the Southern Tier Regional Economic Development Council, will provide the framework for a revitalized economy in the Southern Tier.

In order to quantify the GHG emissions reductions associated with these actions, assumptions were made about the anticipated implementation of each action over the next 20 years. By 2032, the

INDICATORS
<p>Average wages in region over time, by county.</p> <p>Baseline (2010) \$777/week, annual regional average</p> <p>Targets</p> <ul style="list-style-type: none"> ■ Long Term (20 year): 100 percent of national average ■ Short Term (5 year): 90 percent of national average
<p>Economic Development - Housing + Transportation Index: Transportation/Housing affordability</p> <p>Baseline (2010) 55.09 (for 5 of the region's 8 Counties)</p>
<p>Cash receipts from farm sales</p> <p>Baseline (2010) \$338 million in 2009 from cash receipts</p> <p>Targets</p> <ul style="list-style-type: none"> ■ Long Term (20 year): \$497 million (2009 dollars) ■ Short Term (5 year): \$417 million (2009 dollars)

Southern Tier can expect to reduce GHG emissions by 8,600 MTCO₂e by implementing some of these actions. This represents less than a one percent reduction in the overall GHG emissions for the Region.

It is difficult to quantify the GHG impacts of actions taken to create and retain good paying jobs. These actions have the potential to increase regional emissions, or may reduce emissions depending on the type of businesses and workforce that emerges from these investments and partnerships. Similarly, actions taken to support the tourism industry will have an unquantifiable impact on GHG emissions. These actions have the potential to increase regional emissions.

GHG reductions from actions to support farming and related businesses are difficult to quantify. While there are potential GHG benefits of increasing local food purchasing, estimating these benefits on a regional scale is extremely challenging. Transportation emissions account for a small part of food life-cycle emissions, and of that, personal transportation to and from stores and restaurants is greater than upstream supply chain emissions. Furthermore, growing practices are a larger driver of emissions. A local tomato in August will be less GHG-intensive than a long distance tomato in August, but a tomato grown outside in Chile in February and shipped by boat to the U.S. will be less GHG-intensive than a New York tomato grown in a heated and lighted greenhouse in February. Variations in the life-cycle emissions of food vary greatly by type and production technique, and these differences are greater than differences due to the life-cycle transportation emissions. It is assumed that all of these priority actions will need to be implemented to achieve these goals and targets over the Plan's 20-year timeline; other supporting actions can be found in the Supplemental Actions list in the Appendix.

Taking Action

The Southern Tier has significant opportunities for economic success if it is able to leverage its competitive industries, develop a highly skilled workforce, and realize strong academic-industry partnerships. Capitalizing on these opportunities will enable the Southern Tier to reverse the decline of its workforce and attract external investment. The following strategies can be deployed to overcome these challenges and generate jobs with competitive compensation and potential for career progression.

The following nine actions were determined to be the most important economic development-related actions for the Region to focus on. The assumptions used to calculate GHG reduction potential, and the expected GHG reduction for each relevant action, are detailed in the Implementation Strategy in the Appendix. Several actions are also related to the REDC Strategy; these are also noted in the Implementation Strategy. There is also more detail about the actions marked **TOP 22** at the beginning of this Plan.

▶ **TOP 22** 28. Implement the Energy Workforce Development Initiative

First proposed in the Southern Tier Regional Economic Development Council's Strategic Plan

Goal Supported: 7

Description: The Energy Workforce Development Initiative is an initiative of the Southern Tier Regional Economic Development Council (REDC) to develop a highly qualified and vibrant workforce that is prepared to respond to the opportunities resulting from the emergence of the energy industry in the Southern Tier. This Initiative will provide training and specialized skills to build the workforce needed to perform energy efficiency building retrofits and to install renewable energy systems. The Initiative will also prepare workers for employment opportunities in the management, development, operation, and maintenance of complex energy and industrial processes. The Initiative is geared to build on the strength of the Region's workforce. In general, clean-tech and other green jobs do not require advanced education degrees, yet they pay 20 percent higher than the median wage in the U.S.⁸⁵ Creating a strong, vibrant workforce in the renewable energy and energy efficiency sectors will put the Southern Tier in a strong position to reduce greenhouse gas

⁸⁵ See, for example, SFCED, "Green Jobs Paying Off with Greener Salaries," <http://www.sfcged.org/about-sfcged/press/20111/green-jobs-paying-off-with-greener-salaries>.

emissions in the long run. With a growing workforce that is able to respond to new developments in the clean energy sector, the Region can make progress toward reducing energy consumption and related greenhouse gas emissions and increase energy independence while generating jobs and advancement opportunities. According to the REDC, this Initiative, when fully deployed, is anticipated to train 1,000 workers in the Region. Currently, the proposed leaders have limited experience working together.

Potential Leads: Implementing the initiative will require establishing new relationships and improving communication among the key stakeholders to support each other's efforts to maximize energy workforce development, share marketing, and help align needs, skill sets, and curriculum. This Initiative was proposed by the REDC, which will provide key support. The project will draw on the education and training resources of Broome, Corning, and Tompkins Cortland Community Colleges. The colleges will work collaboratively and creatively to deliver education and training using multiple modes of instruction.

▶ **TOP 22 29. Identify, train, and certify contractors to meet increased demand for energy efficiency**

Goal Supported: 7

Description: Ensuring the presence of energy auditors and contractors with the appropriate level of expertise to effectively weatherize existing buildings and construct new energy-efficient structures is critical to reducing overall building energy consumption in the Southern Tier. In New York State, residential buildings accounted for 30 percent of all energy use in 2010, and the commercial sector accounted for another 32.8 percent (most of which also comes from building use).⁸⁶ Thus, reducing building energy consumption will play a large role in achieving New York State's 2050 target of reducing GHG emissions by 80 percent. Furthermore, weatherization of buildings reduces energy costs by an average of 25 percent.⁸⁷ This initiative will prepare the Region's contractors to meet the growing demand for energy efficiency retrofits. Energy auditors and contractors need the proper experience and training to perform energy audits and ratings, weatherization, insulation, and energy efficient construction services. There are two nationally-recognized home performance certification organizations: the Building Performance Institute (BPI) and the Residential Energy Services Network (RESNET). In order for home and business owners to take advantage of financial incentives for energy work offered by the state, they must hire certified contractors. Certification programs can be expensive and time-consuming. While earning certifications can bring contractors work on projects, it can also raise consumer costs. The required paperwork can be a significant burden to a small business operation. Working regionally to assess demand for specific training types, training organizations and employers can determine the most cost-effective delivery locations and scheduling to meet demand.

Potential Leads: Organizations well-suited to undertake this action are local workforce investment boards, community colleges, and Cornell Cooperative Extension partners.

▶ **30. Promote Regional Broadband Communications Projects**

First proposed in the Southern Tier Regional Economic Development Council's Strategic Plan

Goal Supported: 7

Description: Part of the Southern Tier REDC Plan, this action aims to extend broadband service throughout the Region, ranging from sophisticated technology transfer projects between universities and businesses, to rural home-based entrepreneurs. The project has already gained momentum and for the Cleaner Greener Southern Tier Plan the focus is on the strategic economic development to be achieved by extending broadband to the "middle mile" and "last mile" via fiber and/or wireless service that will benefit small businesses, home-based businesses, and residents in rural areas. This effort is essential for boosting rural and agricultural business opportunities and capturing and retaining youth in the Region. Providing internet

⁸⁶ U.S. Department of Energy, Energy Information Administration, New York State Profile and Energy Estimates, <http://www.eia.gov/beta/state/?sid=NY#tabs-2>.

⁸⁷ See, for example, Wald, Matthew, "Focus on Weatherization is Shift on Energy Costs," *The New York Times*, December 29, 2008, http://www.nytimes.com/2008/12/30/us/30weatherize.html?pagewanted=all&_r=0.

access to all residents of the Southern Tier assures equal access and prevents a digital divide from disenfranchising lower income rural populations. While significant progress is being made on increasing service and access in cities and villages, the dispersed development and long distances in rural areas can make service to some areas costly. Within the Region there are both “last mile” and “middle mile” solutions being pursued to overcome these cost barriers.

Potential Leads: Possible leads for this action include economic development and regional planning agencies, local municipalities, and the Southern Tier Network, which is building an optical fiber ring in Chemung, Schuyler, and Steuben Counties with plans to expand within the Region.

▶ 31. Grow local businesses through targeted investment

Goal Supported: 7

Description: This action introduces a new “economic gardening” approach to economic development, which involves investing in small, local businesses to grow them into big, local businesses. This approach models itself after techniques used by venture capitalists to identify firms with potential and support them in the initial stages of development. The idea is that growing small firms requires an up-front investment but can yield large rewards when the companies become successful. This contrasts with the traditional approach of recruiting large companies from the outside of a region or municipality by offering long-term tax breaks or other incentives that commit government resources for years to come. This action will establish partnerships among industry groups and businesses to identify small, local initiatives that show potential for growth and invest capital in those initiatives in their early development. This approach encourages growth that is true to the character of the local community. Potential opportunities include: advanced transportation technologies, particularly those associated with improved transportation information, software, and applications; local food businesses, especially those that capitalize on regional farm-to-table partnerships and value-added product development, like Finger Lakes Fresh expansion in cooperation with Challenge Industries; and water-based ecotourism ventures, building on planned waterfront revitalization projects such as Watkins Glen’s recent and proposed redevelopment work and blueway trail systems like the Cayuga Lake Blueway Trail – a tri-county project; and advanced materials manufacturing startups. This action will help achieve the goal of creating and retaining more good paying jobs. Local businesses can also be strengthened by creating local capital investment groups, such as the new Tompkins LION, where entrepreneurs are looking to invest in sustainable local businesses.

Potential Leads: Possible leads for this action include economic development agencies, financial institutions, and chambers of commerce.

▶ 32. Strengthen university-industry connections to improve and promote workforce development

Goal Supported: 7

Description: This action would encourage collaboration between institutions of higher education and industry. By developing academic-industry feedback loops, in partnership with workforce investment boards, educational institutions can customize their curriculums to prepare students for the regional business climate in exchange for commitments from local companies to support students through internships or full-time employment upon program completion. Job training and educational courses that are coordinated with business opportunities will help ensure that workers develop skills that are relevant to local business needs, increasing their long-term employment options and allowing the Region to maximize economic performance. Since there are several universities, colleges, industry groups, and workforce boards in the Southern Tier, this action will require developing new relationships and ongoing coordination. It will also require acknowledging that, while academic institutions may compete with each other for students, faculty, and grants, each partner has strengths in particular disciplines and programs that may complement the others. The same is true for industry partners. Assessing how these strengths can complement each other can maximize investments in training, which will need to acknowledge potential educational attainment and skills mismatch between the workforce and growing industries.

Potential Leads: Possible leads for this action include workforce development and economic development agencies, as well as colleges and universities.

▶ **33. Expand and promote culinary and agri-tourism opportunities**

Goals Supported: 8 and 9

Description: This action would build upon the success of existing wine and cheese trails, brewing and distilling facilities, farm-to-table restaurants, and other farm-based activities, such as the planned Tompkins Cortland Community College student farm, culinary lab, and restaurant. This action proposes expanded advertisement of existing tastings and tours at local wineries, breweries, and farms. It could also expand and enhance regional circuits that link sites of interest so that tourists can easily navigate between the Region’s various culinary and agri-tourism offerings; and provide informational materials about the Region’s culinary and agricultural traditions. Although the Southern Tier’s agriculture and culinary activities are diffuse and varied, the industry is organizing at a rapid pace, spurred on by extension agents at Cornell Cooperative Extension and by tourism professionals throughout the Region who see the vast potential this action offers for long-term economic development. By inviting visitors to enjoy these aspects of the local culture, the Southern Tier can continue to market itself as a destination for culinary and agri-tourism.

Potential Leads: Possible leads for this action include Cornell Cooperative Extension, educational institutions, and regional and county tourism agencies.

One example of a local culinary tourism attraction is the Finger Lakes Wine Country Restaurant Week. In this weeklong event, local chefs create meals using only ingredients from the Finger Lakes Region. Participating restaurants offer Finger Lakes wine. By sourcing only local food and wine, the restaurant week concept is unique in the United States and could be a larger tourist draw.

▶ **34. Coordinate and market educational and green tourism**

Goal Supported: 8

Description: Highlighting and marketing the Region’s institutions of higher education as tourist attractions and places of lifelong learning have great potential in the Southern Tier with its excellent colleges and universities. Summer colleges for retirees, business people, and youth offer the gamut of learning and recreational opportunities. In addition, building awareness of the Region’s work to implement sustainability strategies, technologies, and projects can serve as an innovative tourism draw. This action would promote educational courses, workshops, demonstrations, and green building tours to help brand the Region as a destination where visitors can “learn how to do it.” Examples include educational tours at EcoVillage at Ithaca, a co-housing development designed to have minimal ecological impact,⁸⁸ and downtown mixed-use projects. The Southern Tier has a wide range of sustainability developers and organizations that host a variety of education and industry events, such as sustainability conferences, that can be marketed as tourist events. While there are many green destinations and activities, they are not yet coordinated and marketed together as a regional program.

Potential Leads: Possible leads for this action include regional and county tourism agencies.

EcoVillage at Ithaca consists of co-housing neighborhoods designed to have minimal ecological impact. EVI offers tours of its facilities, tailored to the visitors’ particular interests (e.g., energy systems, organic farming).

▶ **TOP 22 35. Support development of processing and distribution facilities (Food Hubs) for local and value-added products**

Goal Supported: 9

Description: The Southern Tier Regional Economic Development Council Strategic Plan: 2011–2016 highlights opportunities to grow and diversify agriculture, including implementing new technology to extend the growing season, promoting regional products, creating value-added products, and supporting

⁸⁸ <http://ecovillageithaca.org/evi/>

applications in the renewable energy industry. The plan states that agriculture holds great promise as an emerging growth sector, based on the amount and quality of available land, capacity to respond to demand for biomass, and the possibility for adopting technological changes to improve crops. Expanding value-added agricultural products has the potential to greatly enhance the profitability of farms in the Southern Tier. Promoting local food markets and expanding agricultural infrastructure can provide greater access to locally and regionally grown agricultural products to residents within the Region and to nearby urban marketplaces, such as New York City and Rochester.

Food hubs are aggregation and value-added production and distribution facilities that collaborate with local farms and producers to expand the markets for their products. Food hubs create efficiencies in energy use and producer time by offering cost-effective value-added processes such as freezing, cutting, dehydrating, and packaging that extend shelf life and increase the profitability of local products. They also create infrastructure that facilitates the placement of local foods into regional and state-wide distribution. Establishing and supporting food hubs will bring stability to farmers' seasonal sales and enable local products, already popular in the Southern Tier, to reach tables in schools, institutions, restaurants, and other stores. It will also support expansion of agricultural production, creation of local jobs, and enhancement of the financial and environmental sustainability of Southern Tier agriculture. Challenge Industries in Tompkins County is establishing a 25,000 SF food hub warehouse and distribution facility with value-added production facilities. Smaller-scale farmers and agricultural producers face challenges of processing their products in a cost-effective way, competing with industrial-scale producers, and accessing mainstream markets. This action seeks to overcome those challenges, but transitioning from current business practices and coordinating this effort across hundreds of producers with a range of sizes and needs will require investment in facilities, marketing, production coordination, and enhanced logistics.

Potential Leads: Organizations that might lead this initiative include Cornell Cooperative Extension, Challenge Industries, farmers markets, and the Farm Bureau.

▶ 36. Adopt local food purchasing policies

Goal Supported: 9

Description: This action would further develop existing policies and create new examples that could be adopted across the Region to support the purchase of local products by public institutions, particularly school districts, universities and colleges, hospitals, and jails.⁸⁹ Having a reliable and consistent market allows farmers to increase crop production. School districts often save money when purchasing local products. In order to make the agreement attractive to the growers, prices must be fair, and barriers, restrictions, and requirements must be evaluated and considered in context. There is a significant and growing interest in “buy local” initiatives across New York State, including a Buy Local campaign established by Cornell Cooperative Extension in Tompkins and surrounding counties. Program goals are to foster the environmental, economic, and social vitality of the community by increasing the connections between consumers and farmers. Through outreach, marketing, and special initiatives Buy Local seeks to raise individual and institutional awareness about the benefits of buying fresh locally grown and made products and to make local food an integral part of daily life. Many public institutions must meet various state and Federal food and purchasing requirements, and need to ensure a reliable, consistent supply for menu planning purposes. The food hub distribution network described in Action 35 will help ensure that institutions that adopt buy local policies will be able to obtain a reliable supply.

Potential Leads: Possible leads for this action include Cornell Cooperative Extension and institutions, such as public schools, higher education, and hospitals.

Tompkins Cortland Community College is proposing to develop a sustainable produce farm on campus that would train students in sustainable farming and would directly provide food for the campus cafeteria as well as a culinary lab and training restaurant to be established in downtown Ithaca.

⁸⁹ Delaware County Department of Economic Development, *Delaware County Agricultural Growth and Sustainability Plan 2010-2015*.

WORKING LANDS AND OPEN SPACE

The Southern Tier is largely defined by its vast swaths of forested land, rolling fields, picturesque gorges, mighty rivers, and the breathtaking Finger Lakes. Working lands and open spaces are vital to rural economic development and tourism and to creating that intangible “rural character” which is treasured by so many. Conservation of these lands is important for many other reasons, including reducing flooding potential, enhancing recreational opportunities, preserving habitat, protecting public drinking water supplies, and, of particular interest in this Plan, removing carbon from the atmosphere through absorption by growing trees and plants, known as carbon sequestration.

While the business of farming is largely covered in the economic development chapter, this chapter focuses on farmland and forestland and the preservation and enhancement of lands and waters. It identifies opportunities and outlines implementation actions necessary to meet the regional goals for working lands and open space:

- 10. Promote best management of fields, forests, and farmland to keep working lands in production, protect natural resources, and increase carbon sequestration.**
- 11. Preserve and connect natural resources, open spaces, and access to waterways, to protect regional environment, ecology, habitat and scenic areas, and support outdoor recreation.**

Snapshot of the Region Today

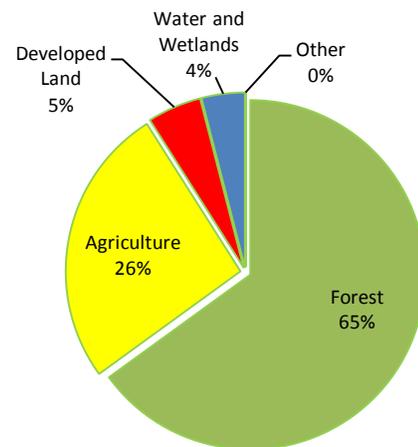
The Southern Tier is overwhelmingly rural in nature with nearly 95 percent of its 4 million acres covered in forests, agricultural lands, water, and wetlands. These natural resources perform a variety of environmental functions and provide economic and other benefits, from timber and agricultural products to clean water.

Agriculture

The plentiful water resources and rich soil in the Region provide excellent farming conditions. In 2007, there were 5,733 farms, comprising 1,150,000 acres.⁹⁰ The primary agricultural industry is dairy; there is also a substantial amount of livestock production. The primary crops in the Region are forage, corn for grain and silage, oats, and Christmas trees. Between 2002 and 2007, the market value of products sold by local farms increased by 36 percent. All eight counties saw a rise in the value of products sold.

Steuben County has significantly more farmland than any of the other counties, accounting for 42 percent of the land area in that county. All but one county saw a reduction in the total amount of farmland between 2002 and 2007 (see figure below), although the loss in Steuben County was minimal. Tompkins County saw an overall increase in total farmland of almost eight percent in the same period.

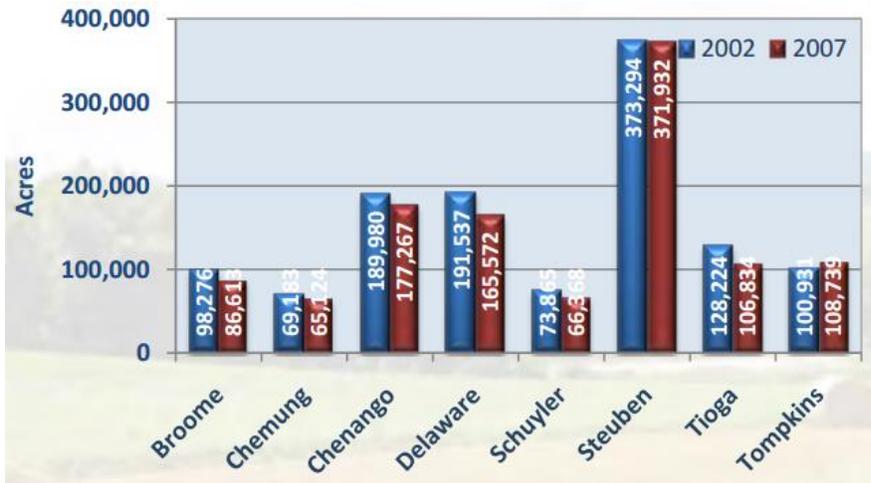
FIGURE 18 ■ Land Cover in the Southern Tier Region



National Land Cover Database 2006 (NLCD2006)

⁹⁰ Regional Economic Development Council of the Southern Tier. Strategic Economic Development Plan: 2011-2016. http://regionalcouncils.ny.gov/themes/nyopenrc/rc-files/southerntier/CU_RegEcoDevRprt_loR.pdf.

FIGURE 19 ■ Acres of Farmland in the Southern Tier in 2002 and 2007



Regional Economic Development Council

Forests

Regional forest products, such as lumber and maple syrup, are important NYS commodities and often provide valuable added income to farm operations and residents in rural areas. The Southern Tier has 2.6 million acres of forested lands in a mix of public and private ownership. A total of 180,000 acres are located in NYS Forests, which are all certified as sustainably managed under the Forest Stewardship Council and Sustainable Forest Initiative. Approximately 68,000 acres of private forests are certified as sustainable under the American Tree Farm System, a sustainable management program more commonly used for small privately owned forests. Additionally, many landowners participate in programs conducted by the New York Forest Owners Association to promote sustainable forestry practices and improve stewardship on privately owned woodlands.

Wetlands and Other Water Resources

Wetlands provide a multitude of ecological, economic, and social benefits. They provide habitat for fish, wildlife, and a variety of plants. Wetlands are nurseries for many freshwater fishes and shellfish of commercial and recreational importance. They are also important landscape features because they hold and slowly release flood water and snow melt, recharge groundwater, recycle nutrients, and provide recreation and wildlife viewing opportunities.

The Southern Tier has 37,233 acres in the 825 designated “freshwater wetlands” that are subject to NYSDEC jurisdiction. Because the area is dominated by rolling hills, wetlands are not common in much of the Region. Historic and current land use practices have destroyed many high-quality wetlands, with small wetlands being filled, drained, or converted to ponds, and large wetlands being reduced in size by agriculture, road construction, and other development.

The Southern Tier is home to three Finger Lakes: Keuka, Seneca, and Cayuga; four major rivers: the Susquehanna, Chemung, Chenango, and Delaware; and two large reservoirs: the Cannonsville and Pepacton. These water bodies, along with other rivers and streams, supply fresh water to New York City, feed the Chesapeake Bay, and also flow to the Great Lakes and Atlantic Ocean. Water bodies and waterways are some of the most distinguishing natural features of the Region. Providing fresh water and recreational resources, as well as supporting agriculture, food processing, and other industries, water is a critical resource (see the Water Management chapter for more information on the Region’s water resources).

State and Federal Open Space

The Catskill Park is a mountainous area of public and private lands partially located in the Southern Tier; over 100,000 acres in Delaware County is located in the Catskill Park. The Park includes the Catskill Forest Preserve, defined as the 287,500 acres of state land within the Catskill Park, and composed of forests with meadows, remnants of old farmsteads, lakes, rivers, springs, waterfalls, and cliffs. It serves as New York City's drinking watershed, an important recreation area, and serves as an ecological and scenic reserve.

There are 16 State Parks in the Southern Tier, including one marine park, providing recreational opportunities to residents and visitors alike. There are eight State Wildlife Management Areas, the largest of which is Connecticut Hill with over 11,000 acres. Other State holdings include boat launches, an environmental education center, a wetland, and fish hatcheries. The Finger Lakes National Forest is also partially located in the Region, along with three National Recreation Areas.

TABLE 19 ■ Open Space Holdings of State and Federal Government within the Southern Tier

Type	Number of Acres
NYS Forests: Reforestation Areas	174,000
NYS Wildlife Management Areas	26,300
NYS Parks	10,900
Catskill Forest Preserve	4,000
Other NYS Holdings	2,000
Finger Lakes National Forest	9,800
National Recreation Areas	4,200

FIGURE 20 ■ Southern Tier Parks and Open Space



Trails

The Finger Lakes Trail, which winds through all of the counties in the Region except Broome, is a significant recreational resource, as are several other existing regional multi-use trails. These include the Catharine Valley Trail in Schuyler and Chemung Counties; Vestal Rail, Binghamton River, Chenango River, and Otsiningo Park Trails in Broome County; Jim Schug, East Hill Recreationway, South Hill Recreationway, and Dryden Trails in Tompkins County; Chenango Greenway in Chenango County; Catskill Scenic Trail in Delaware County; and urban multi-use trails within the cities of Binghamton, Corning, Elmira, and Ithaca.

A number of trails are planned or under construction, including the Chemung River Trail in Steuben, Chemung, and Tioga Counties; the Binghamton Greenway in Broome County; and the Black Diamond and Cayuga Waterfront Trails in Tompkins County. The Cayuga Lake Blueway Water Trail for non-motorized boaters is under development in Tompkins County.

Emissions and Sequestration

When considering the GHG emissions associated with working lands and open space, it is important to quantify both the amount of emissions associated with agricultural and forestry operations and the amount of carbon that plants and trees are able to remove from the atmosphere to offset GHG emissions in the Region.

GHG Emissions: Emissions specific to the agricultural sector include methane that is released directly from livestock, as well as nitrous oxide emissions associated with fertilizer application. This chapter excludes emissions associated with the electricity and heat required for farm buildings (which are addressed in Economic Development as commercial emissions) and the energy used to run tractors and other vehicles (which are addressed in Transportation).

Agriculture emissions are 651,389 MTCO₂e and account for seven percent of the Southern Tier's GHG emissions. Emissions are shown in TABLE 20. Steuben County, with the highest number of dairy and beef cows, has the most agriculture sector emissions in the Region, accounting for 30 percent of total regional agriculture emissions.

TABLE 20 ■ 2010 Agriculture GHG Emissions by Source (MTCO₂e)

	Enteric Fermentation*	Manure Management	Agricultural Soils	TOTAL	Percent of Total
Broome County	29,267	5,794	12,624	47,685	7%
Chemung County	15,778	3,109	8,711	27,599	4%
Chenango County	70,661	14,125	29,581	114,367	18%
Delaware County	55,659	10,755	23,955	90,369	14%
Schuyler County	24,065	5,290	9,293	38,648	6%
Steuben County	112,028	21,850	58,399	192,276	30%
Tioga County	35,666	7,723	17,136	60,526	9%
Tompkins County	47,205	10,077	22,637	79,919	12%
Total	390,329	78,724	182,336	651,389	

* Enteric fermentation is a digestive process by which carbohydrates are broken down by microorganisms into simple molecules for absorption into the bloodstream of an animal. It is one of the factors in increased methane emissions.

Although not included in agricultural sector GHG emissions calculations, it is worth noting that, on average, food travels more than 1,500 miles in the U.S. from where it is grown, to where it is processed, to arrival on the table. Shipping food long distances uses a lot of fossil fuels, resulting in high GHG emissions. By promoting local food, which is enjoying a renaissance nationally and regionally, reductions in transportation emissions can be coupled with local economic gains. Local food promotion activities are common in the Region, including farmers' markets, community supported agriculture, community gardens, urban agriculture, and rural-urban market connections. These activities improve regional health outcomes, rural economy, and sustainability. A resounding theme heard across the Southern Tier during the Plan's public meetings is the enthusiasm and pride in our regional agriculture and hopes for growing it into a sustainable economic force.

Sequestration: The Southern Tier's forests serve as significant carbon sinks, offsetting some of the Region's GHG emissions by absorbing carbon from the atmosphere. The Region's wetlands and agricultural areas also have potential to provide significant soil carbon sequestration.

Beyond increasing the number of trees and forests, implementation of good management practices can enhance forest stocks and associated carbon sequestration. Such practices include modification of harvest cycles and species selection for forests. Agricultural lands can also be managed to increase their sequestration value by implementing strategies like converting cropland to grass/legume pasture or converting cropland from conventional tillage to no-till or rotational grazing.

TABLE 21 ■ 2010 Net Emissions from LULUCF (MTCO₂e)

	Total Emissions (MT CO ₂ e)
Broome County	415,668
Chemung County	192,003
Chenango County	(2,612,113)
Delaware County	(2,371,521)
Schuyler County	(1,670,944)
Steuben County	(1,078,995)
Tioga County	(434,567)
Tompkins County	637,964
Total	(1,887,956)

The Land Use, Land Use Change and Forestry (LULUCF) measurement reflects the impact of changes in land cover on the capacity of forests to sequester carbon. The acreage of forested lands in the Region has been increasing as abandoned agriculture lands have reverted to forest. Land use changes in the Southern Tier between 2005 and 2010 resulted in annual net sequestration of 6,900,000 MTCO₂e. Tompkins, Broome, and Chemung Counties showed net emissions from LULUCF while Chenango, Delaware, Schuyler, Steuben, and Tioga Counties had net carbon sequestration from LULUCF. It is important to note that this accounting of carbon sequestration attributable to an increase in regional forest stocks is merely an estimate, and the changes estimated between 2005 and 2010 are largely due to the long-term land-use changes discussed above.

Regional Plans for Working Lands and Open Space

Open Space Conservation and Trails: Most Southern Tier counties have open space and conservation plans and are implementing efforts to conserve, link, and establish new open spaces for recreational and environmental purposes. The Finger Lakes Land Trust, a proactive non-profit conservation organization, has spearheaded regional conservation efforts in the five counties within its service area, including projects to connect, buffer, and expand State forests, trails, and wildlife areas.



Since the early 1990's, there has been an increased focus on planning for and constructing multi-use trails along abandoned railroad or canal corridors and adjacent to rivers and streams, particularly where they connect population centers, work places, and recreational destinations. The three MPOs have all provided leadership in planning multi-use trail networks and funding to implement a variety of trail projects in partnership with their member agencies and NYSDOT. STC and STE regional planning boards, along with their member counties, have conducted trail and river corridor studies and identified trail projects, many of which have been constructed. Recently, communities have promoted blueway water trails and waterfront activities as means to support waterfront redevelopment, expand public access to regional waterways, and increase open space use and conservation.

The Finger Lakes Land Trust has prepared two key conservation plans for the Southern Tier:

- *Conservation Focus Areas of the Upper Susquehanna Watershed within the Finger Lakes Land Trust's Service Area* describes conservation threats and priorities in much of the Southern Tier, with 11 recommended conservation focus areas supporting protection of the Region's best remaining natural resources, including large forest blocks, wetlands, trout streams, rare species populations, bird concentration areas, unique natural areas, and wildlife corridors.
- *The Finger Lakes Trail in the Emerald Necklace: A Plan for Corridor Protection and Enhancement* focuses on strategies for buffering, linking, and better protecting the lands around the 78-mile section of the 900 mile Finger Lakes Trail that runs through the "Emerald Necklace," a crescent of protected forest lands within six State Forests, two State Parks, a State Wildlife Management Area, the Finger Lakes National Forest, eight Finger Lakes Land Trust Nature Preserves, and six Cornell Plantations Natural Areas totaling more than 50,000 acres in Schuyler, Seneca, Tioga, and Tompkins Counties.

Other regional conservation plans include:

- The *Chemung River Trail Assessment & Comprehensive Master Plan* recommends a network of riverbank trails and public access areas within the City of Elmira and five river towns.

- The *Susquehanna-Chemung Action Plan* integrates human needs, economic issues, and environmental concerns to provide a unified vision for the Susquehanna River and Chemung River watersheds and promotes funding for projects that benefit the watersheds' residents.
- The *Binghamton Metropolitan Greenways Study* evaluates the feasibility of developing riverbank trails along 25 miles of the Susquehanna and Chenango Rivers.
- The *Catharine Valley Trail Master Plan* studies the regional trail linkage from the Elmira-Horseheads area to Montour Falls and Watkins Glen.
- The *Black Diamond Trail Master Plan* outlines development of a 15-mile, off-road pedestrian and bicycle trail facility proposed for Tompkins County. The trail will provide residents and visitors with an alternate way to travel to several destinations in the county including four major State Parks and many other popular community destinations in the City of Ithaca and the Towns of Ithaca and Ulysses.

Agriculture Development: The majority of Southern Tier counties have agricultural and farmland protection plans, and are implementing efforts to conserve and enhance farmland and support agricultural operations. These plans include initiatives to brand and market farm products; create new mechanisms to aggregate, sell, and distribute products; create value-added enterprises; create direct marketing programs; establish niche markets for new specialty crops; promote agri-tourism development; support sustainable wage-enhancing activities in rural areas; develop biomass, both wood and crops, as a renewable resource for home heating; and permanently protect farmland through conservation easements.

Leadership in New York State

Several State-level conservation and open space plans address the key natural area priorities in the Southern Tier. The *New York State Open Space Conservation Plan* proposes strategies to enhance and protect open space, as well as identifies priority protection areas, while the *New York State Comprehensive Outdoor Recreation Plan* identifies large-scale park, trail, and conservation projects.

NYSDAM administers programs that protect farmland, foster agricultural best management practices, and promote New York State products. The Farmland Protection Implementation Program to purchase development rights on agricultural properties is administered locally by county planning departments and soil and water conservation districts with assistance from municipalities and local conservation organizations. The program covers up to 75 percent of the total costs for implementation activities to protect valuable farmlands. Additionally, the Pride of New York Program was developed to promote and support the sale of agricultural products grown and processed in New York State.

The NYC Watershed Agricultural Council and the Upper Susquehanna Coalition administer and fund implementation of best management practices on farms. The NYC Watershed Agricultural Council protects the unfiltered water supply of millions of NYC residents. The Upper Susquehanna Coalition is part of the Chesapeake Bay Watershed Program and provides technical assistance and financial support for farmers. Additionally, many local organizations and landowners are active in New York State's Agricultural Environmental Management initiative, helping farmers protect the environment while maintaining the health and vitality of their farm operations.

Issues and Opportunities

Issues

According to the Finger Lakes Land Trust's publication, *Conservation Focus Areas of the Upper Susquehanna Watershed within the Finger Lakes Land Trust's Service Area*, local concern about the loss of open space is rising due to increased threats from commercial, industrial, and residential development along the Chemung and Susquehanna River corridors. These concerns are related to highway upgrades to the I-86 interstate highway corridor, proposed U.S. Environmental Protection Agency regulation of water quality in regional rivers, potential

Marcellus and Utica Shale gas development, site constraints on developing in the flat valley floors, and attractiveness of hilltops with panoramic views for residential development near Corning, Elmira, and Ithaca.

In addition to development pressure along highways, hilltops and valleys, rural sprawl from housing development on rural road frontage in agricultural areas negatively impacts agricultural operations, natural systems, and the rural character of the Region.

Most hardwoods in the Southern Tier are harvested and milled locally, and are then shipped to China and other international destinations for their furniture making industries. Local forest products and product development suffer from having no strong local markets. Currently, the only program that focuses on marketing local forest products is Cornell Cooperative Extension of Tompkins County's Local Building Materials Initiative, which identifies resources within 100 miles of Ithaca. While this covers most of the Southern Tier for building materials and suppliers, the actual marketing is focused on Tompkins County. Forest Stewardship Council (FSC) certification of forests is costly and there are no FSC-Certified lumber mills and no programs to market local certified wood products. Without such a marketing campaign, there is little incentive for landowners or mill owners to pursue FSC or comparable certification. Developing a woodworkers trail and expanded local materials marketing could begin to build greater demand for sustainable wood products, thus helping the Region overcome these barriers.

Implementation funds from NYSDEC and USDA for best management practices (BMPs) on local farms have fluctuated in recent years. In much of the Southern Tier, there are farms that would be eligible for, and interested in, implementing BMPs, but the required 25 percent match for state programs and 50 percent for federal programs puts this out of the reach of many farmers. In recent years funding for key State conservation programs, such as the Environmental Protection Fund and the Farmland Protection Implementation Program (purchase of development rights), have varied, impacting the ability to protect agricultural and natural resources. Since there is already more interest in BMP funding programs than available funding, increasing both funding and technical assistance will increase the implementation of BMPs and have a positive effect on soil conservation and water quality.

Another issue is the persistent problem of deer and pest management, as well as the increasing stress put on the Region's working lands and open space from invasive species, such as the emerald ash borer. Although there are significant efforts underway to track and anticipate invasive species in the Region, little has been done at the municipal level in the way of planning for pests and invasive species.

Opportunities

The Southern Tier is rich in intellectual capital to spur agricultural and forestry innovation with premier institutions and agencies, such as Cornell University, Cornell Cooperative Extension, Binghamton University, the Upper Susquehanna Coalition, and the New York City Department of Environmental Protection. There are already strong collaborative partnerships between academic institutions in the Region and local partners, particularly among the Cornell Cooperative Extensions in all eight counties. This presents a significant opportunity to expand the rural economy through applied research and development.

The *Southern Tier Regional Economic Development Council Strategic Plan: 2011–2016* highlights opportunities to grow and diversify agriculture, including implementing new technology to extend the growing season, promoting regional products, creating value-added products, and supporting applications in the renewable energy industry. The plan states that agriculture holds great promise as an emerging growth sector based on the amount and quality of available land, capacity to respond to demand for biomass, and possibility for adopting technological changes to improve crops. Expanding value-added agricultural products has the potential to greatly enhance the profitability of Southern Tier farms. Promoting local food markets and expanding agricultural infrastructure can provide residents and businesses with greater access to locally and regionally grown agricultural products within the Region and to nearby urban marketplaces, such as New York City and Rochester.

The agricultural industry is projected to grow modestly in the next decade. The animal production industry is the largest and most competitive of the sector and is expected to increase operations, in part to support rapidly growing yogurt production in New York State, including Chobani in Chenango County. Forestry and logging are also projected to increase in both employment and competitiveness over the next decade. While biomass is frequently harvested from the Region's forests for home heating as firewood, there is a significant opportunity for expanding the sustainable management of the area's forests and brushland to support jobs in renewable energy. Biodiesel presents another opportunity, as oil seed crops used to produce biodiesel can be used in crop rotation to enhance farm income.

The vast acreages of forested and agricultural land offer carbon sequestration potential and GHG emissions offset opportunities. Sequestering carbon in plants and soils can assist the Region and the State in meeting their GHG emissions reduction goals, and has the potential to generate income for area landholders if a carbon exchange, or cap and trade, program is ever broadly implemented.

The Finger Lakes Land Trust is a major leader in the Southern Tier's conservation activities, with five of the eight counties in the Region lying in its service area. The Land Trust protects farmland and natural areas with conservation easements and acquisitions and prepares regional conservation reports that identify priority protection projects to conserve key forests, farms, natural areas, and trail corridors. Another example of an active organization in land protection is the Friends of the Chemung River Watershed, which works to preserve and promote the Chemung, Canisteo, Cohocton, Cowanesque, and Tioga Rivers and the hills and valleys that surround them.

Communities throughout the Southern Tier Region are already implementing successful programs in the areas of working lands and open space protection. Replication of programs that have been proven successful is believed to be the most successful strategy, especially in the near term. Priority Actions identified for working lands and open space were derived from successful programs such as:

- **The Local Building Materials Initiative** sponsored by Cornell Cooperative Extension of Tompkins County and the Ithaca Green Building Alliance.
- **The Danby Land Bank Cooperative** is a biomass cooperative of crop growers, harvesters, and rural landowners located in the Town of Danby. The Cooperative serves as a biomass supplier and works with its members to create a marketing and distribution network and to qualify for agricultural assessments.
- **The Groundswell Center for Local Food & Farming** is an agriculture education nonprofit serving the Finger Lakes area. Groundswell's core work is nurturing the next generation of farmers and cultivating knowledgeable "food citizens" through experience-based educational programs.
- **The Finger Lakes Land Trust publication, *Conservation Focus Areas of the Upper Susquehanna Watershed within the Finger Lakes Land Trust's Service Area***, is a great example of an open space conservation plan. Additionally, the Tompkins County Conservation Strategy marries analysis of natural features and agricultural resources in the county to identify priority actions to support the rural areas of the county.
- **The Delaware County Trail Initiative** mapped abandoned rail/trolley lines to connect population centers.
- **The Town of Ithaca's Conservation Zone** is a working example of a conservation zoning ordinance. It was developed to protect the wooded and steep slopes along the west shore of Cayuga Lake.

A Southern Tier Example

Local Building Materials Initiative – Cornell Cooperative Extension⁹¹

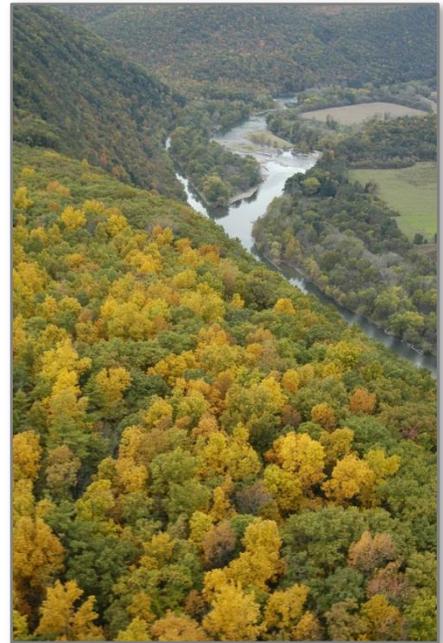
While the Southern Tier has a wealth of forests that could be sustainably managed to produce local building materials, these resources are somewhat underutilized. Cornell Cooperative Extension of Tompkins County and the Ithaca Green Building Alliance are supporting a local building materials initiative to promote the use of

⁹¹ <http://cctompkins.org/home/green-building/local-building-materials-initiative>

building materials manufactured within 100 miles of Ithaca, which includes the vast majority of the Region. This initiative promotes the purchase of raw materials available in the Region, wood products that are manufactured locally, recycled and salvaged materials, and other items that can be found in locally-owned shops.

The Local Building Materials Directory lists over 30 sawmills and suppliers that mill, process, and distribute a variety of locally-produced lumber and wood products, which helps to create a market for sustainable-managed forests and wood harvesting. Combined with consumer outreach and a rapidly-growing green building industry, this initiative holds significant potential to increase the use of local lumber in construction, furniture and cabinet production. The Directory also provides sources for locally-produced stone, masonry, metalwork, windows and doors, landscaping, and other specialties.

Because this initiative promotes the circulation of money, goods, and labor locally, it also provides economic, environmental, and social benefits directly to the Region. Local resourcing, manufacturing, selling and purchasing, provides local jobs and contributes to the local tax base. Creating a regional growing, manufacturing and purchasing cycle also has a lower environmental impact than buying and selling out-of-state or international materials that are shipped long distances via carbon intensive freight trains, trucks, cargo ships, or airplanes. Moreover, encouraging the production and purchase of local resources inspires a sense of community for consumers, manufacturers, and residents who can take part in a robust, local economic activity. Cornell Cooperative Extension also provides a directory of nearly 100 regional businesses that sell or manufacture local goods, and organizes education and outreach for residents and businesses to understand more about the benefits of the initiative.



Finger Lakes Land Trust, Steege Hill Preserve

Strategy for the Future

Goals

- 10. Promote best management of fields, forests, and farmland to keep working lands in production, protect natural resources, and increase carbon sequestration.**
- 11. Preserve and connect natural resources, open spaces, and access to waterways, to protect regional environment, ecology, habitat and scenic areas, and support outdoor recreation.**

These two goals were selected for Working Lands and Open Space in recognition that the Region has an abundance of high quality natural resources that should be showcased, preserved, and managed.

Indicators and Targets

Evaluating the acres enrolled in the AEM program and as certified forests is a way to see progress in promoting best management practices for farms and forests. Complete data is not always available, so changes over time may fluctuate greatly. Tracking the acres added to various public and private land protection programs will evaluate a small portion of efforts to preserve and connect natural resources, open spaces, and access to waterways. Other efforts to protect these resources are harder to track since they involve a combination of voluntary landowner practices, local government regulation, and public education programs.

Seven priority actions were identified through the Cleaner Greener Southern Tier planning process, based on technical analysis, stakeholder support, feasibility, and greatest GHG reduction potential. The chosen targets, based on an increase in the land formally enrolled in management programs or protected through formal

agreements with conservation organizations will be the result of the combination of actions proposed. Some actions will not directly help to achieve the identified targets (e.g., maximize farm-based renewable energy production opportunities), but will help to achieve a broader identified goal (e.g., to keep working lands in production). In order to quantify the GHG emissions reductions that may be expected, assumptions were made about the anticipated implementation of each action over the next 20 years. By 2032, the Southern Tier can expect to reduce GHG emissions and increase carbon sequestration by a net 923,000 MTCO₂e by implementing these actions. This represents an 11 percent reduction in the agriculture sector and a 12 percent increase in carbon sequestration in the land use, land-use change, and forestry sector, or a net 9 percent reduction in the overall GHG emissions for the Region. All of these priority actions will need to be implemented to achieve these goals and targets over the Plan's 20-year timeline; other supporting actions can be found in the Supplemental Actions list in the Appendix.

Taking Action

The following seven actions were determined to be the most important working lands-related actions for the Region to focus on. The assumptions used to calculate GHG reduction potential, and the expected GHG reduction for each relevant action, are detailed in the Implementation Strategy in the Appendix. Some actions are also related to the REDC Strategy; these are also noted in the Implementation Strategy. There is also more detail about the actions marked **TOP 22** at the beginning of this Plan.

▶ **TOP 22** 37. Develop a regional program to promote sustainable forestry and wood products

Goal Supported: 10

Description: The Southern Tier has a wealth of forest resources that can be used to develop local building materials, but they are underutilized. Most hardwoods in the Southern Tier are harvested and milled locally but are then shipped to China and other international destinations for their furniture making industries. Local forest products – both raw and value-added – suffer from a lack of strong local markets. Developing a regional program to promote sustainable forestry and wood products will support the creation of a sustainable materials market. By conducting broader outreach and branding of locally grown and sustainably managed woods and wood products, additional revenue can be generated in the rural portions of the economy, benefitting rural landowners and farmers. Encouraging participation in sustainable forest certification programs is one way to promote sustainable management and production of forest resources. If either a certified or sustainably managed local wood product market is developed, the number of jobs in this area will likely be expanded, though the extent of this impact is difficult to predict. Certification of forests can be costly, and there are no FSC-Certified lumber mills and no programs to market local certified wood products. There is little incentive for landowners or mill owners to pursue certification. Developing a woodworkers trail and expanded local materials marketing could begin to build greater demand.

Potential Leads: Organizations that are well suited to undertake this action are Cornell Cooperative Extension, regional agencies, and colleges and universities with robust forestry programs.

INDICATORS

Acres of agricultural land enrolled in Agricultural Environmental Management Program (AEM) and Acres of Certified, Managed Forestland

Baseline (2010)

240,000 acres minimum, representing known certified forestland. Complete data not available for forests.

Targets

- Long Term (20 year): 100,000 added acres enrolled in these programs.
- Short Term (5 year): 25,000 added acres enrolled in these programs.

Acres protected through NYSDEC and other public, non-profit and private protected lands.

Baseline (2010)

246,326 acres (NYSDEC Lands). Complete data on other public, non-profit, and private protected lands not available.

Targets

- Long Term (20 year): 30,000 added acres protected.
- Short Term (5 year): 7,500 added acres protected.

▶ **38. Develop a regional biomass consortium**

Goal Supported: 10

Description: This action would establish a network of regional growers, harvesters, processors, and distributors to develop and expand regional biomass markets, with assistance from natural resources, conservation, and agricultural experts. Given the availability of marginal farmland and extensive forests in the Southern Tier, there is significant potential to grow a market for biomass for home, farm, and commercial/institutional heating. Because biomass production and distribution can be labor-intensive, it is a good market for small landowners and small businesses. Creating reliable supply chains and marketing could be linked to the Southern Tier Bioenergy Partnership. While developing organizations focused on production and marketing, such as the Danby Land Bank Cooperative, can increase biomass supply, the larger challenge is in increasing demand, as described in Action 10 - facilitating the use of biomass for heating.

The Danby Land Bank Cooperative, a biomass cooperative of crop growers, harvesters, and rural landowners, serves as a biomass supplier. It is working with its member producers to create a marketing and distribution network. Establishing a regionally-based entity similar to this cooperative, may offer opportunities for other value-added forest and agricultural opportunities.

Potential Leads: Potential leads for this action include Cornell Cooperative Extension and regional planning boards, in conjunction with local governments.

▶ **39. Promote adoption and funding of BMPs on farms**

Goal Supported: 10

Description: A number of organizations promote Best Management Practices (BMPs) on Southern Tier farms, including County Soil and Water Conservation Districts, Southern Tier regional planning and development boards, the Upper Susquehanna Coalition, and NYC Department of Environmental Protection (in Delaware County only). These BMPs focus primarily on protecting water quality, with especially stringent regulations for portions of the Region that are situated in the Chesapeake Bay and New York City multi-regional watersheds. Currently, Agricultural Environmental Management (AEM) programs provide effective systems for tracking and monitoring best practices on farms across the Southern Tier, and participation in the AEM program is required for eligibility for other Federal and state conservation programs and the associated cost share.

Development of a land management plan is a key step in identifying the most effective BMPs for specific areas; these can include deer and pest management and emerald ash borer and other invasive species management. BMPs can also be established for agro forestry in wooded pastures, such as mushrooms, nuts, and other permaculture crops. USDA Natural Resources Conservation Service Non-Point Source Priority Area and the 2012 Chesapeake Bay Watershed Initiative Priority Areas provide financial and technical assistance to eligible producers to install practices to meet program goals. These can include energy, water and air quality, forestry, and organic farming projects. This action would promote outreach to farmers about implementing BMPs to maintain water quality and best agricultural management practices. This outreach can also serve as an opportunity to discuss enhanced supply chain, marketing, and product development to improve economic prospects for Southern Tier farms. Since there is already more interest in BMP funding programs than available funding, increasing both funding and technical assistance for putting together projects and funding applications will increase the implementation of BMPs and have a positive effect on soil conservation and water quality.

Potential Leads: Possible leads for this action include county Soil and Water Conservation Districts and the Upper Susquehanna Coalition.

▶ **40. Encourage new farm startups and farm transfers to next generation**

Goal Supported: 10

Description: Retaining existing family farms (through next-of-kin or non-family business partners) and encouraging new farm startups is key to growing the agricultural sector of the Southern Tier, while ensuring long-term sustainability of the Region’s agricultural industry. While improved markets and financial returns are critical, providing programs to educate new farmers about business operations, sustainable farming practices, and financing for farm acquisition and upgrades are also needed. The Rural Initiative Venture Fund is a regional program designed to reduce financial risk and increase sustainability of agriculture and forestry ventures through product development and promotion, business infrastructure development and utilization of new technology. The Fund will provide startup and expansion capital through a revolving loan fund and grants, and leverage existing programs such as the Farmer’s Market Initiative to create new wholesale and marketing businesses and new processing facilities.

Potential Leads: While access to funding for land and equipment is a key obstacle for new farmers, it can be leveraged with education and technical assistance from Cornell Cooperative Extension and other farm-oriented resources.

▶ **41. Maximize farm-based renewable energy production opportunities**

Goals Supported: 10 and 2.

Description: This action would harness the land resources of agricultural properties to promote farm-based renewable energy production opportunities, including harvesting marginal brushland for sustainable timber, growing biomass or biodiesel crops, and installing renewable technologies, such as anaerobic digesters to produce methane from manure. This would encourage farmers to convert marginal lands to perennial biomass production for on-farm energy production and to retrofit fossil-fuel dependent systems in farm buildings, residences, and industrial facilities with renewable energy sources. Farmers benefit by adding value in the case of biomass production and/or reducing on-farm energy costs with renewable installations that would augment current livelihoods. The primary barriers include funding and technical assistance for renewable energy projects, and increasing demand for biomass production. In addition, biomass energy systems that utilize non-wood agricultural products are still in the early stages of development. Key elements of this action are also discussed in several renewable energy actions.

Potential Leads: Possible leads for this action include county Soil and Water Conservation Districts, Cornell Cooperative Extension, and regional planning agencies.

▶ **42. Coordinate planning and implementation for priority conservation and agricultural protection areas**

Goal Supported: 11

Description: Many of the Southern Tier counties have both agricultural protection and conservation/open space plans in place. This action would take a regional perspective, identifying both preservation and conservation opportunities to yield a comprehensive view of the most critical lands needing protection and support. It can also develop regional conservation and agricultural protection priorities that might create more fundable projects, due to cross-municipal collaboration and expanded local leveraging possibilities. Strategies for permanent protection can include conservation easements, acquisition, purchase of development rights, and zoning restrictions. Conservation easements are an excellent and cost effective strategy to permanently protect the natural resources and forests of the Southern Tier. This action would also create and implement a funded program (or increase funding for existing programs) to pursue the easement and/or property acquisition priorities identified in protection plans. Since most of the strategies involved are well known, the primary barriers include a lack of sufficient funding and technical assistance to conduct planning and to acquire easements and implement projects. For agricultural lands, the USDA Natural Resources Conservation Service (NRCS) offers a variety of easement programs such as the Farm and Ranch Lands Protection Program, Grassland Reserve Program, and Wetlands Reserve Programs. The NRCS also offers small, limited and beginning farmer assistance, conservation innovation grants and wildlife

habitat incentive programs.⁹² Purchase of development rights is also a possibility for interested farmers wishing to permanently conserve their lands in agricultural use. These actions will support efforts to permanently protect, strategically expand, and systematically connect the Region's network of forests, farms, natural areas, rivers, and streams. This includes trails, parks, and open spaces; resource conservation, green infrastructure, and stream buffers; and lake and river access. It also includes planning and education, along with access to natural resources, to build public awareness and support.

Potential Leads: Local and regional planning agencies.

▶ 43. Identify and develop priority trail segments to connect key destinations

Goal Supported: 11

Description: MPOs, counties, and towns in the Southern Tier have all expressed interest in promoting the development and use of trails, and existing plans include multimodal trails in Tompkins County, along the Susquehanna River in Broome and Tioga Counties, and along abandoned railroads in Delaware County. This action would identify and develop priority trail segments to connect regional trail systems and support recreation opportunities in natural areas. Since most of the strategies involved are well known, the primary barriers include a lack of sufficient funding and technical assistance to conduct planning and to acquire easements and implement projects. While efforts have been made to think regionally during the preparation of many of these studies, the Southern Tier, as defined for this plan, has never been systematically studied for regional trails. Identifying and developing priority trail segments to connect key development and employment destinations would help prioritize one or more trail projects in each MPO area or rural county and plan for the implementation of at least one regional trail connector.

A number of trails are currently planned or under construction, such as the Susquehanna Headwaters River Trail, the Utica MainLine Rail Restoration Project, the Broome County Greenways, and the Black Diamond and Cayuga Waterfront Trails in Tompkins County. Completing planned trails will be a key step towards building a regional network. The plan could also identify potential links that might be built by developers as part of their project infrastructure and amenities. Requiring developers to build trail segments through their properties can be accomplished via local government land use authority, either through Amenity Zoning or use of the Official Map. If a trail is included on a municipality's official map, then proposed development must incorporate that trail into development plans. This program could also identify funding for preparing feasibility studies, concept designs, and cost estimates to advance key greenway and blueway trail projects that require additional study.

Potential Leads: MPOs, local and regional planning agencies.

The Delaware County Trail Initiative, which mapped abandoned rail/trolley lines to connect population centers, is a good example of how trail segments could form a regional network. This could also include recreational blueways.

⁹² <http://www.ny.nrcs.usda.gov/programs/>

CLIMATE CHANGE ADAPTATION

The challenge of climate change for the Southern Tier is two-fold: to reduce our contribution to global warming by supporting the State GHG emissions reduction target and to prepare for the inevitable effects of climate change. Overall, this Plan will help communities take steps to reduce GHG emissions. This chapter focuses on taking action to address current issues associated with climate change and preparing for anticipated future problems.

Climate change adaptation refers to incorporating climate projections into decision-making about plans, policies, practices, and investments. Adaptation strategies can include both reducing the risks and capitalizing on the opportunities associated with climate change. In the Southern Tier, actions may include fortifying infrastructure to withstand potential increases in flooding, shifting agricultural practices to take advantage of an extended growing season, and expanding public health programs to respond to increased instances of extreme heat events or vector-borne illnesses.

This chapter identifies opportunities and implementation actions necessary to meet the regional goals for climate adaptation and flood mitigation:

12. **Identify and plan for the economic, environmental, and social impacts of climate change.**
13. **Minimize flood losses by preserving and enhancing floodplains and wetlands, and by limiting development in flood-prone areas.**

Snapshot of the Region Today

All of New York's regions are fortunate to have new, region-specific information available to help them prepare for climate adaptation: *ClimAID: the Integrated Assessment for Effective Climate Change Adaptation Strategies in New York State*.⁹³ The NYSERDA-commissioned report, released in November 2011, was written by scientists from Cornell University, Columbia University, and the City University of New York. The report and adaptation guidance focus exclusively on climate change adaptation strategies specific to NYS, and are geared to assist local decisionmakers in developing and adopting adaptation strategies. The ClimAID report highlights the need for the Southern Tier to prepare for the following impacts:

- **Heat waves** will become more frequent and intense, increasing heat-related illness and death and posing new challenges to the energy system, air quality, and agriculture.
- **Summer drought** is projected to increase, affecting water supply, agriculture, ecosystems, and energy production.
- **Heavy downpours** are increasing and are projected to increase further. These can lead to flooding and related impacts on water quality, infrastructure, and agriculture.
- **Major changes to ecosystems**, including species range shifts, population crashes, and other sudden transformations, could have wide-ranging impacts, not only for natural systems but also for health, agriculture, and other sectors.

“Rising energy costs and climate change are two of the defining challenges of the 21st century. Binghamton has already experienced many climate extremes in the last decade and set new local records for flooding, number of summer days over 90 degrees, and extreme winter snowfalls.”

City of Binghamton Energy and Climate Action Plan, 2011.

“Extreme weather is the new normal. In the past two years, we have had two storms, each with the odds of a 100-year occurrence. Recent events demand that we get serious once and for all.”

New York Governor Andrew Cuomo, op-ed in the wake of Superstorm Sandy, *Daily News*, November 15, 2012.

⁹³ Text cited in this Plan comes from the summary ClimAID document: Responding to Climate Change in New York State: Synthesis Report, NYSERDA, 2011.

The ClimAID report predicts temperatures will rise across the state, by 1.5 to 3°F by the 2020s, 3 to 5.5°F by the 2050s, and 4 to 9°F by the 2080s, with the lower ends of these ranges expected under lower GHG emissions and the higher ends for higher emissions scenarios. The report notes these are not the best and worst cases, just the most likely; sharp cuts in global emissions could result in temperature increases lower than the bottom ends of these ranges, while a continuation of business-as-usual could result in increases higher than the high ends.

Due to the increase in temperature, atmospheric moisture will increase and the annual average precipitation is projected to increase by up to five percent by the 2020s, up to ten percent by the 2050s, and up to 15 percent by the 2080s. This will not be distributed evenly over the course of the year. Much of this additional precipitation is likely to occur during the winter months as rain, with the possibility of slightly reduced precipitation projected for the late summer and early fall. Continuing the observed trend, more precipitation is expected in heavy downpours and less in light rains.

Vulnerabilities specific to the Southern Tier identified in the ClimAID report include flooding increases along the Susquehanna River, milk production losses in a region dominated by dairy, and, as one of the southernmost regions in the state, impacts related to being at the front line for the state as invasive insects, weeds and other pests move north.

In addition, the report highlights that the Southern Tier is vulnerable in other ways: rural areas are more vulnerable to, and have less capacity to cope with, extreme events such as floods, droughts, ice storms, and other climate-related stressors; areas that depend on agriculture and tourism (such as fishing, skiing, and snowmobiling) may be especially in need of adaptation assistance; and low-income urban neighborhoods are less able to cope with heat waves and flooding.

Specific groups of people identified in the ClimAID report as being particularly vulnerable include elderly, disabled, and health-compromised individuals; low-income groups with limited ability to meet higher energy costs; farm workers who may be exposed to more chemicals if pesticide use increases in response to climate change; asthma sufferers as air quality declines during heat waves; and people who depend on public transportation for evacuation during emergencies. Small businesses, more than larger businesses, are also identified as being particularly vulnerable, as they may have heightened difficulty coping with costly climate related interruptions and stresses, such as power and communication service disruptions.

The ClimAID report identifies eight sectors likely to face climate change impacts in the state: those relevant to the Southern Tier are listed below.

Water Resources

- Heavy downpours have increased over the past 50 years, and this trend is projected to continue, causing an increase in localized flash flooding in urban areas and hilly regions. Flooding has the potential to increase pollutants in the water supply and inundate wastewater treatment plants and other vulnerable development within floodplains.
- Less frequent summer rainfall will likely result in additional, and possibly longer, summer dry periods. This may affect the ability of water supply systems to meet demands. Reduced summer flows on large rivers and lowered groundwater tables could lead to conflicts among competing water users. Smaller water systems are more vulnerable to drought and other disruptions than larger systems, since large systems tend to be more closely managed and often have more resources for dealing with drought.

Ecosystems

- Increasing water temperatures in rivers and streams will affect aquatic health and reduce the capacity of streams to assimilate effluent from wastewater treatment plants.
- Climate change will favor the expansion of some invasive species into New York, such as kudzu, an aggressive weed, and the hemlock woolly adelgid, an insect pest. Species with a wide range of suitable habitat and food (such as white-tailed deer) may also benefit.

- Lakes, streams, inland wetlands, and associated aquatic species will be highly vulnerable to changes in the timing, supply, and intensity of rainfall and snowmelt, groundwater recharge, and duration of ice cover. Increasing water temperatures will negatively affect brook trout and other native coldwater fish.
- Vulnerable species and ecosystems in the Southern Tier include spruce-fir forests of the Catskill mountains; hemlock forests; brook trout and other coldwater fish; snow-dependent species such as snowshoe hare, voles, and other rodents, and their winter predators such as fox and bobcat; moose; bird species such as Baltimore oriole and rose-breasted grosbeak; and amphibians and other wetland species.

Agriculture

- Increased weed and pest pressure associated with longer growing seasons and warmer winters will be an increasingly important challenge.
- Water management will be a more serious challenge for New York farmers due to the increased frequency of heavy rainfall events and more frequent and intense summer water deficits by mid to late century.
- Opportunities to explore new crops, new varieties, and new markets will come with higher temperatures and a longer growing season.
- Smaller farms may have less information and training and less capital to invest in adaptation strategies such as stress-tolerant plant varieties, increased chemical and water inputs, and enhanced livestock cooling. By adding to already severe competitive pressure, climate change is likely to exacerbate current trends towards consolidation into fewer, larger farms, especially in the dairy sector.
- Farms specializing in cool-season crops may have challenges finding appropriate new varieties that meet both production demands and market expectations. Without proactive development of non-chemical approaches, increased pesticide and fertilizer use could harm sensitive environments, such as streams and rivers.
- Increasing temperatures at the beginning of winter reduce cold hardiness and can raise the probability of midwinter damage to grapes. Earlier arrival of spring, or a prolonged warm period in spring, may lead to premature budding and increased vulnerability to spring frost. In the long term, warmer winters and a longer growing season may bring opportunities to introduce a wider range of high-value, less cold-tolerant European red wine grape varieties such as Cabernet Sauvignon and Zinfandel, currently constrained by climate.
- Heat stress has both short- and long-term effects on the health and performance of dairy cattle. Short-term impacts include decreases in feed intake and milk production. Under heat stress, cows spend less time resting and more time standing and walking. A decrease of 1 hour of resting time is associated with a decrease of 2 to 3 pounds of milk produced per cow. Severe heat stress can cause lameness and poor reproductive performance, with subsequent long-term negative effects on milk production. By the 2080s, the magnitude of annual NYS milk production decline associated with heat stress is projected to increase six-fold compared to current heat stress-related impacts. Economic losses associated with the projected increase in heat stress range from \$37 to \$66 per cow per year.

Energy

- More frequent heat waves will cause an increase in the use of air conditioning, stressing power supplies and increasing peak load demand.
- The availability and reliability of solar power systems are vulnerable to changes in cloud cover, although this may be offset by advances in technology; wind power systems are similarly vulnerable to changes in wind speed and direction.
- Biomass energy availability depends on weather conditions during the growing season, which will be affected by a changing climate.
- Higher winter temperatures are expected to decrease winter heating demand, which will primarily affect natural gas markets, while increases in cooling demand will affect electricity markets.

Transportation

- Transportation systems are vulnerable to ice and snowstorms, although requirements for salting and snow removal may decrease as precipitation tends to occur more often as rain than snow. Freeze/thaw cycles that disturb roadbeds may increase in some regions as winter temperatures rise. Transportation systems are also susceptible to flooding.
- Runways may need to be lengthened in some locations since hotter air provides less lift and hence requires higher speeds for takeoff. Newer, more powerful aircraft can reduce this potential impact.
- NYS has the most days of freezing rain per year in the nation. This affects air and ground transportation directly and also indirectly through electric and communication outages. It is unknown how climate change will influence the frequency of freezing rain in the future.
- Workers on hourly payrolls can less afford transportation-related work loss or delays compared to more affluent, salaried employees whose pay does not depend on the number of hours worked.
- Lower income neighborhoods, whether rural, suburban, or urban, generally already have fewer transportation options and little or no redundancy. Increases in extreme events will worsen their situation.

Telecommunications

- Communication service delivery is vulnerable to hurricanes, lightning, ice, snow, windstorms, and other extreme weather events, some of which are projected to change in frequency and/or intensity.
- The delivery of telecommunication services is sensitive to power outages, such as those resulting from the increased demand associated with heat waves, which are expected to increase with climate change.
- Customers in rural, remote areas are more vulnerable to service disruptions than customers in urban areas because they have fewer backup service options and often lack wireless and broadband services. Restoration of communication services following a storm typically happens first in urban areas and then in rural areas, with smaller, remote communities likely to be restored last; this places people in rural areas at increased risk during emergencies.
- Lower-income populations are more likely to drop landline services; this increases their risk during emergency situations, as a result of their more limited communication options.

Public Health

- Heat-related illness and death are projected to increase, while cold-related death is projected to decrease. Increases in heat-related death are projected to outweigh reductions in cold-related death.
- More intense precipitation and flooding along the coasts and rivers could lead to increased stress and mental health impacts, impaired ability to deliver public health and medical services, increased respiratory diseases such as asthma, and increased outbreaks of gastrointestinal diseases.
- Cardiovascular and respiratory-related illness and death will be affected by worsening air quality, including more smog, wildfires, pollens, and molds.
- Vector-borne diseases, such as those spread by mosquitoes and ticks (like West Nile virus), may expand or their distribution patterns may change.
- Water supply, recreational water quality, and food production will be at increased risk due to increased temperatures and changing precipitation patterns.
- Children, outdoor laborers, and athletes also may be at greater risk for respiratory diseases than those who spend more time indoors and are less active.

Regional Climate Change Adaptation Plans

To date, the majority of climate change work in the Region has been focused on mitigation and GHG emissions reductions, with the exception of the 2012 draft updates of the *Tioga County Hazard Mitigation Plan*⁹⁴ and the *Delaware County Hazard Mitigation Plan*, which assess climate change adaptation. These plans use the projections from ClimAID to assess the role of global climate change on the future probability of floods, severe storms, extreme heat, and drought.

A review of the regional transportation, land use, conservation, flood mitigation, and watershed management plans revealed that climate change adaptation is not currently widely considered in long range plans. Plans in the Region addressing climate change adaptation to some extent include: *Elmira-Chemung Transportation Council 2030 Long Range Plan*⁹⁵ that recommends conducting a climate change impact analysis; the *Ithaca-Tompkins County Transportation Council 2030 Long Range Transportation Plan Update*⁹⁶ that highlights the necessity to address climate change and the future fluctuation of the availability of fuel; and the *Susquehanna-Chemung Action Plan*⁹⁷ that discusses climate change impacts with regards to ecosystems, the watershed, and agricultural practices.

Leadership in New York State

The Region benefits from leadership on climate change adaptation by various entities in New York State. Key reports include ClimAID's robust statewide assessment; the New York State Climate Action Council's⁹⁸ 2010 report that outlined options to adapt to climate change; New York City's detailed vulnerability assessment in PlaNYC; and the NYSDOH's⁹⁹ participation in the Center for Disease Control's Climate-Ready States and Cities Initiatives¹⁰⁰ to investigate, prepare for, and respond to the potential health effects of climate change.

Issues and Opportunities

Recent devastating floods in the Region have brought the issue to the fore and local leaders and residents are taking steps to make their communities more resilient to future flooding, drought, heat, and other hazards. This Plan is the first to identify and plan for the ramifications of a new climate future in the Southern Tier. Future temperature and precipitation changes warrant consideration of a broad range of activities including hazard mitigation, comprehensive and transportation plans, capital investments, agriculture, public health, emergency management, and monitoring efforts.



Issues

As the local climate continues to change, precipitation and runoff patterns will shift and storms will be more intense, resulting in more direct runoff and flooding. The Southern Tier has been subject to repeated flood damage, with significant flood events occurring in 1972 because of Tropical Storm Agnes, in 2006 because of a

⁹⁴ <http://www.tiogacountyny.com/departments/emergency-management/tioga-county-all-hazards-mitigation-plan.html>

⁹⁵ <http://elmirampo.org/images/2009FinalLRP.pdf>

⁹⁶ <http://www.tompkins-co.org/itctc/lrp/2030lrp-chapters/2030lrp-final-pdfs/2030lrp-TOC-final.htm>

⁹⁷ http://www.stcplanning.org/usr/Program_Areas/Water_Resources/Susquehanna-Chemung_Action_Plan/S_C_Action_Plan_2012.pdf

⁹⁸ <http://www.nyclimatechange.us/>

⁹⁹ <http://www.dec.ny.gov/energy/68917.html>

¹⁰⁰ http://www.cdc.gov/climatechange/climate_ready.htm

combination of storm systems moving through the Susquehanna Basin, and in 2011 because of Hurricane Irene and Tropical Storm Lee (each storm decimated different areas). Several of these recent “100-year flood” events have hit within a five-year period. Not only do large-scale flooding events occur, but also smaller localized flooding is a problem throughout the year.¹⁰¹ Significant economic and personal costs have resulted from these floods. Between 1978 and 2012, the National Flood Insurance Program has paid \$1.1 billion for insured flood losses in the State of New York.¹⁰² In an effort to reduce flood losses, municipalities have enacted floodplain management regulations based on the National Flood Insurance Program (NFIP) standards. Flood insurance is available throughout any community that enforces the NFIP development standards and is required for many buildings in the mapped 100-year flood zone. While the NFIP establishes minimum standards for new development, it does not prevent construction in flood-prone areas and generally does not reduce the vulnerability of at-risk development pre-dating these NFIP standards.

Despite their frequency and severity, flooding events are not always adequately taken into consideration during land use planning. Floodplains are often otherwise attractive for development due to their locations in communities, proximity to water amenities, and level site characteristics. In some parts of the Region, Flood Insurance Rate Maps, issued by the Federal Emergency Management Agency (FEMA), are woefully out-of-date and do not represent current flood risk. These flood maps were developed using historic flood information and then-existing land use information to delineate special flood hazard areas and the risk premium zones applicable to a community. Communities in the Southern Tier can reduce the damage from future storms by collecting data on local flooding events, reducing the vulnerability of development, preserving buffers along waterways, and fully enforcing all state and local stormwater ordinances. While purchase of such lands can be expensive, there is growing awareness in the Southern Tier of its vulnerability to impacts from flooding such as those seen post-storms Lee and Irene. Programs are being developed by counties, land trusts, and state and federal agencies to chip away at this action over time.

Many Southern Tier communities are protected by structural flood control projects, including reservoirs and levees. These structural projects reduce – but do not eliminate – flood risks. This leads to complacency about the residual risks associated with extreme events or failure. Federal floodplain mapping, floodplain development standards, and flood insurance programs are poorly suited for managing flood risks in areas with levee protection. This results in significant costs and economic impacts if levees are not accredited as providing protection on Flood Insurance Rate Maps. Some Southern Tier levee systems are not high enough for accreditation; others will only be accredited if funding is procured for the evaluation process. These costs are in addition to the ongoing expense that local, state, and federal entities currently undertake to operate and maintain the region’s levees and dams. The complexity of these issues and the associated costs contribute to increased controversy regarding new flood hazard mapping.

Constrained budgets often divert local attention from long-term problems, including impacts of climate change. Despite the relatively high frequency of severe flooding, there is a limited understanding among the public and policymakers of the causes of flooding and the link between flooding and land development. Additionally, it can be difficult to convince emergency service providers and municipal officials of the diverse impacts of climate change and its likely impacts on the frequency and severity of community hazards. This is exacerbated in the Southern Tier, where many municipalities have few full-time staff members and planners. While it is a challenge for each municipality to fully understand and analyze the range of impacts for each risk, working together with regional agencies, universities, and state agencies will make the analysis of risks, impacts, and mitigation strategies more cost-effective, and help to coordinate mitigation strategies.

One issue identified in the City of Binghamton’s *2011 Energy and Climate Action Plan* is the need for private and public sector institutions providing services to vulnerable populations to engage in proactive planning to ensure that services remain at acceptable levels in the event of adverse climate change events. It calls for all institutions to build redundancies and fail-safes into their operations in case one component of a system fails.

¹⁰¹ STCRPDB, 2012

¹⁰² FEMA-NFIP, 2012

Opportunities

The Southern Tier has many potential partners and models to follow to move forward in identifying and implementing climate change adaptation strategies. Credible organizations, such as the Consortium for Climate Risk in the Urban Northeast,¹⁰³ NYSERDA, the National Weather Service Forecast Office in Binghamton, and the Cornell Cooperative Extension¹⁰⁴ possess deep understanding of climate science and impacts on valuable resources.

Another opportunity is that counties in the Southern Tier already collaborate on transportation plans, watershed management, a Regional Flood Warning Service, and this sustainability plan. This experience with collaboration offers an opportunity to use collective resources to establish local climate projections to be considered in future planning efforts.

The ClimAID report points out climate change may create new opportunities related to a longer, warmer growing season for agriculture and the potential for abundant water resources.

One significant opportunity for the Southern Tier is to incorporate anticipated changes in temperature and precipitation into hazard mitigation planning. Each of the eight counties must update their FEMA-approved Multi-Jurisdictional Hazard Mitigation Plan every five years. These updates could include climate change projections as an effective and low-cost approach to assessing the probability of hazards. Climate change is already mentioned in half of the hazard mitigation plans and all the plans include analysis of at least some of the natural hazards expected to be impacted by climate change. These hazard mitigation plans provide a solid starting point for adaptation planning within the Region.

Since appropriate adaptation actions are specific to location and threat, counties and municipalities should be encouraged to implement place-based adaptation strategies. Adaptation actions may include planting urban trees to reduce the urban heat island effect and energy demand during heat waves, planting climate-resilient landscaping plants that are drought resistant, creating a heat advisory program and identifying cooling centers for residents without air conditioning, improving flood mitigation strategies, invasive species planning and management, and shifting local agricultural practices to respond to the changes in temperature and precipitation.

The actions that follow will help guide counties and municipalities, planning organizations, and other governing bodies through a process of integrating climate change projections into plans. The actions support three overarching strategies: identifying the best available climate projections, promoting success through collaboration, and integrating climate change into long range planning. Adaptation strategies are also incorporated into other goals in this Plan. Successful local programs inspiring some of the priority actions include:

- **The Southern Tier Central Regional Flood Mitigation Assistance Program** provides local governments, businesses, residents, and organizations with technical support to implement a variety of flood risk management activities.¹⁰⁵
- **Tompkins County's Stream Corridor Restoration and Flood Hazard Mitigation Program** helps residents and municipalities avoid property damages associated with future flood events.
- **Tioga County's Multi-Jurisdictional Hazard Mitigation Plan** includes the ClimAID temperature and precipitation projections.
- **Broome County's Flood Task Force** was activated in response to devastating floods in 2006. The Task Force advocated for the update of local and regional floodplain maps to better calculate flood-protection requirements.

¹⁰³ Available online: <http://ccrun.org/>

¹⁰⁴ Available online: <http://www.cce.cornell.edu/Pages/Default.aspx>

¹⁰⁵ "STC Flood Assistance Program," Southern Tier Central Regional Planning & Development Board, Website. Available online: <http://www.stcplanning.org/index.asp?pagelid=86>

A Southern Tier Example

Tioga County Multi-Jurisdictional Hazard Mitigation Plan

The Disaster Mitigation Act of 2000 requires local governments to create and regularly update a Hazard Mitigation Plan (HMP) that identifies potential hazards to the well-being of the community and its residents, and outlines actions that can be taken to both prevent and mitigate these risks. To receive disaster mitigation funds from the Federal Emergency Management Association (FEMA), local governments must develop these plans. Hazards commonly identified in HMPs include severe storms, earthquakes, floods, fire, landslides, pandemics, heat waves, drought, and hazardous materials.

Currently, FEMA does not require governments to address climate change in their HMPs. Nevertheless, it is becoming increasingly common for cities and regions to consider the projected impacts of climate change in their assessment of hazards in their HMPs. The Tioga County Multi-Jurisdictional Hazard Mitigation Plan uses the projections from ClimAID to assess the role of global climate change on the future probability of floods, severe storms, extreme heat, and drought. The Multi-Jurisdictional Plan also identifies the general risks that climate change poses to the dairy industry, which dominates the agricultural economy in Tioga County. Finally, the Plan identifies the specific ways in which climate change will exacerbate the prevalence and impacts of the region's hazards.



Strategy for the Future

Goals

- 12. Identify and plan for the economic, environmental, and social impacts of climate change.**
- 13. Minimize flood losses by preserving and enhancing floodplains and wetlands, and by limiting development in flood-prone areas.**

These two goals were selected for Climate Change Adaptation in recognition that the Southern Tier has been hard hit by flooding in the past five years, highlighting the need to prepare for the other anticipated impacts of climate change.

Indicators and Targets

Identifying the degree to which Hazard Mitigation Plans, which are updated every five years, address climate change and adaptation can indicate the level of planning for the impacts of climate change. Data are available in the form of published plans. Participation in the CRS Program will identify those communities that have chosen to use the resources of the National Flood Insurance Program to help reduce flood losses.

Six priority actions were identified through the planning process, based on technical analysis, stakeholder support, feasibility, and greatest GHG reduction potential. Together they will help achieve the targets shown in the accompanying box, largely by laying the groundwork for community action to address climate change through appropriate plans and programs. The GHG benefits of the actions designed to identify and plan for the impacts of climate change cannot be readily quantified. The GHG benefits of the actions to minimize flood losses cannot be quantified separately from Action 42, so were incorporated into that emissions reduction figure. These measures are likely to result in reforestation of some stream banks, and will help achieve the 800 acres per year assumed in action 42. In addition, there are likely to be benefits from the avoided energy and materials needed to rebuild after floods, though the energy and emissions cost of events has not been quantified and would rely in large part on life-cycle emissions that may occur upstream from the Region's baseline. It is assumed that all of these priority actions will need to be implemented to achieve these goals and targets over

the Plan's 20-year timeline; other supporting actions can be found in the Supplemental Actions list in the Appendix.

Taking Action

The following six actions were determined to be the most important climate adaptation-related actions for the Region to focus on. The assumptions used to calculate GHG reduction potential, and the expected GHG reduction for each relevant action, are detailed in the Implementation Strategy in the Appendix. Some actions are also related to the REDC Strategy; these are also noted in the Implementation Strategy. There is also more detail about the actions marked **TOP 22** at the beginning of this Plan.

▶ **TOP 22** 44. Incorporate anticipated climate projections, impacts and proposed mitigation strategies into Hazard Mitigation Plan updates

Goals Supported: 12 and 13

Description: ClimAID, a 2011 NYSERDA-commissioned report on anticipated climate projections for New York State, highlights the need for the Southern Tier to prepare for climate change related impacts, including heavy downpours and increased flooding, heat waves, summer droughts, and major changes to ecosystems and crops. Southern Tier counties and municipalities, many of which are prone to flooding, already have Hazard Mitigation Plans (HMPs), which consider natural and manmade hazards that affect the Region. In order to be eligible for various Federal Emergency Management Agency (FEMA) mitigation funds, jurisdictions are required to develop and update plans every five years according to standards prescribed by FEMA. These updates provide an opportunity to consider the role climate change plays in relation to a community's hazards. Incorporating climate change into these plans is both prudent and an efficient use of resources. Including an analysis of historic disaster events and the likelihood that the climate will change in the future allows planners to anticipate potential disaster events and plan for their mitigation. Evaluating the community risk, and the range of potential measures to mitigate this risk, will allow municipalities to identify the most appropriate and efficient ways to reduce risk and allow them to proactively prepare projects to leverage funding opportunities as they arise. In addition, including projects that reduce impacts from climate change into HMP updates allows those projects to be eligible for federal and state funding for disaster mitigation efforts. It can be difficult to convince emergency service providers and municipal officials of the diverse impacts of climate change and its likely impacts on the frequency and severity of community hazards. While it is a challenge for each municipality to fully understand and analyze the range of impacts for each risk, working together with regional agencies, universities, and state agencies will make the analysis of risks, impacts, and mitigation strategies more cost-effective, and help to coordinate mitigation strategies.

INDICATORS

The degree to which climate change and adaptation is discussed within the required Hazard Mitigation Plans.

Baseline (2010)

- Tier One: 4 of 8 (50%) of HMPs mention climate change
- Tier Two: 1 of 8 (12.5%) of HMPs discuss climate change impacts and specific vulnerabilities
- Tier Three: 0 of 8 (0%) of HMPs include a climate change vulnerability assessment and suggest adaptation strategies

Targets:

Inclusion of climate risks in HMPs and associated strategies to reduce vulnerability to these risks.

- Long Term (20 year):
 - Tier One: 8 of 8 (100%)
 - Tier Two: 8 of 8 (100%)
 - Tier Three: 6 of 8 (75%)
- Short Term (5 year):
 - Tier One: 8 of 8 (100%)
 - Tier Two: 4 of 8 (50%)
 - Tier Three: 1 of 8 (12.5%)

Increased participation in the Community Rating System (CRS) program of the National Flood Insurance Program.

Baseline (2010):

13 municipalities participate in CRS

Targets:

- Long Term (20 year): Increase CRS participation to
 - 100% of municipalities with more than 100 NFIP policies and
 - 50% percent of those with 50-100 policies.
- Short Term (5 year): Increase CRS participation to
 - 30% of municipalities with more than 100 NFIP policies
 - 15% of municipalities with 50-100 NFIP policies.

Potential Leads: Organizations well-suited to undertake this action are regional, county, city, and town planners and emergency service planners.

▶ **45. Assess the viability of current and potential future crops**

Goal Supported: 12

Description: A regional group, such as the ad hoc climate change working group proposed as a supplemental action, could work with local agricultural producers to evaluate the potential for the continued success of crops that are currently grown in the Region, as well as identify current damages and dangers. They could help bring together experts to recognize crops that may be more productive under future climatic conditions and techniques to help mitigate the impacts of extended dry periods and intense rain events. By identifying specific hazards that are likely to occur over time, these experts could help meet the changing needs of the agricultural community. Lack of shared understanding about projected long-term impacts and lack of funding, are the primary issues.

Potential Leads: Possible leads for this action include county Soil and Water Conservation Districts and Cornell Cooperative Extension, with support from related university research projects.

▶ **46. Update Flood Insurance Rate Maps, map additional flood-related hazards, and manage development in high risk areas**

Goal Supported: 13

Description: Existing floodplain maps are based on historical observations and flood probability estimates. While this practice may have been adequate in the past, the changes in precipitation patterns combined with an increase in construction and impervious surfaces make these maps imperfect and in need of updating. Floodplain maps should accurately represent current flood hazards, with advisory information about future potential conditions, so that they are effective tools for reducing flood losses. The effort is limited by constrained budgets, technical limitations for anticipating future flood hazards, and community resistance to expanding floodplain designations. In some instances, FEMA has released updated floodplain maps for communities, but some have not yet been adopted by local governments. Recognizing that map development and adoption is a time consuming process, this initiative should focus on areas where the FEMA maps have not yet been updated and on information that supplements data provided on regulatory floodplain maps. Counties, cities, villages, and agencies in the Southern Tier will need to work with FEMA to update Flood Insurance Rate Maps and also develop additional advisory information. These efforts should include the impact of: existing and planned land development; flood mitigation improvements (including levees); past floods; recurring flooding; shifts in riverine ecosystems (e.g., the loss of riparian forests or wetlands); changes in precipitation patterns; erosion hazard areas; and residual risks behind flood control levees. In order to use this information effectively, municipalities may need technical assistance to enforce minimum floodplain development standards, enact higher standards, integrate flood risks into comprehensive plans, and address flood hazards in other land use regulations.

In response to devastating floods in 2006, Broome County activated a Flood Task Force that advocated for updated floodplain maps to better document flood hazards and manage development in flood-prone areas.

Potential Leads: Possible leads for this action include county water quality coordinating committees, councils of government, and regional planning agencies.

▶ **47. Prioritize high risk floodplains for conservation through acquisition and easement**

Goal Supported: 13

Description: Buildings are frequently constructed in the 100-year floodplain and other flood-prone areas. Reducing the vulnerability of existing development can minimize property loss/damage, but generally does not protect or restore ecosystem functions in the floodplains. Regulatory restrictions can be used to manage development on flood-prone parcels. However, existing floodplain development standards generally do not prohibit development or preserve natural floodplain functions. Floodplain easements are a potentially more effective method for limiting development in priority flood-prone locations. Floodplain easements are permanent conservation easements that provide the Natural Resources Conservation Service (NRCS) with the full authority to restore and enhance the floodplain's functions and values.¹⁰⁶ At particularly critical locations, government acquisition authority can be used in order to limit flood damages and to protect the flood-carrying capacity of the riparian corridor. This action can be applied to areas outside the NRCS program, by land trusts and other organizations that can purchase and manage easements and property. FEMA buyouts can also be used to implement this action in flood-impacted areas that are currently developed. While purchase of such lands can be expensive, there is growing awareness in the Southern Tier of its vulnerability to impacts from flooding such as those seen post-storms Lee and Irene.

Potential Leads: Programs are being developed by counties, land trusts, and state and federal agencies to chip away at this action over time. Opportunities to purchase flood-damaged property are often lost due to the slow processing time and other difficulties with federal buyout programs.

▶ **48. Establish and promote undeveloped buffers for streams and wetlands**

Goal Supported: 13

Description: Counties, cities, and villages in the Southern Tier can use buffers as a cost-effective measure to preserve riparian forests, wetlands, and floodplains by preventing development within a minimum distance of a stream or wetland. A buffer is an area of permanent vegetation that may consist of grasses, shrubs, and trees that provide valuable benefits to streams, creeks, and rivers. Buffers also reduce flood damage by directing development to safer locations with less risk of flooding and erosion. Buffer protection strategies should also address fencing to keep livestock away from streambeds. Communities in the Southern Tier can establish a minimum buffer width, such as 100 ft. or 300 ft., from rivers, streams, lake shores, and wetlands. Criteria used in determining adequate buffer sizes should include stream size, value of ecosystem services around the stream, intensity of adjacent land use, and specific buffer functions required.¹⁰⁷ Key barriers include constrained budgets for planning such programs and making improvements necessary to protect buffer areas. The Tompkins County Stream Buffer Protection Program developed tools to properly protect and restore stream buffers, including a stream buffer planting guide, which identifies how and what to plant in the stream buffer. Additional assistance, sample language, and educational resources can enhance the ability of municipalities to implement buffer regulations and educate property owners about management of buffer areas.

Potential Leads: Possible leads for this action include regional and county planning agencies, county Soil and Water Conservation Districts, and municipalities.

The Town of Dryden recommends a buffer be maintained, to the maximum extent possible, between land development activities (including the placement of silt fences) and streams and wetlands.

¹⁰⁶ "Emergency Watershed Protection Program – Floodplain Easements," USDA Natural Resources Conservation Service, Website, Available Online: <http://www.wi.nrcs.usda.gov/programs/ewp/fpe.html>

¹⁰⁷ Castelle, A.J., A.W. Johnson and C. Conolly. "Wetland and Stream Buffer Size Requirements – A Review." *Journal of Environmental Quality*, 1994. Available online: http://www.nj.gov/drbc/library/documents/Flood_Website/FRES/WendelgassBuffer_publications.pdf

▶ **49. Develop incentives to encourage property owners to protect streams and buffers**

Goal Supported: 13

Description: Incentives can help motivate landowners and municipalities to take proactive steps to reduce property loss, protect water quality, and build greater resilience to future flood damages. Incentive programs can pay landowners to adopt conservation practices on private property. The Maryland State Buffer Incentive Program pays landowners to plant and maintain trees along streams and shorelines.¹⁰⁸ Key barriers include a lack of sufficient funding for incentives; existing programs do not provide incentives for non-agricultural buffers. An example from agriculture practice that could be applied to stream buffers is the Conservation Reserve Enhancement Program; this offers agricultural landowners technical support and financial incentives to install forested buffers and other conservation practices on eligible land.¹⁰⁹ A habitat bank is a market-based solution that allows developers to purchase credits to fund habitat creation, restoration, or enhancement on another parcel to offset anticipated adverse impacts to similar nearby ecosystems.¹¹⁰ County and regional agencies should continue to support existing incentive programs for agricultural land and investigate alternatives for improved management of streams and riparian corridors on non-agricultural land.

Potential Leads: Possible leads for this action include regional and county planning agencies and municipalities.

¹⁰⁸ Lynch Lori. "Riparian Buffer Financial Assistance Opportunities," Maryland Cooperative Extension, 2002. Available online: <http://www.riparianbuffers.umd.edu/fact/FS769.html>

¹⁰⁹ "Conservation Programs," USDA Farm Service Agency, Website. Available online: <http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=cep>

¹¹⁰ "Habitat Banking FAQs," The Environment Bank LTD. Available Online: <http://www.environmentbank.com/docs/Habitat-Banking-FAQs.pdf>

WATER MANAGEMENT

The picturesque rivers, streams, and lakes of the Southern Tier offer clean drinking water, abundant fishing and recreational opportunities, and excellent aquatic habitat. These water resources are some of the Region's greatest natural assets. This chapter gives an overview of the Southern Tier's water systems, water quality, and water and wastewater infrastructure. Targets and actions support the two regional sustainability goals:

14. Efficiently manage and upgrade existing water, sewer, and other utility infrastructure to support compact development and reduce energy use.

15. Improve and protect water quality and quantity.

Snapshot of the Region Today

The Southern Tier lies within four watersheds and is home to three Finger Lakes: Keuka, Seneca, and Cayuga as well as four major rivers: the Susquehanna, Chemung, Chenango, and Delaware. The Region also holds two reservoirs: the Cannonsville and Pepacton that supply fresh water to the City of New York. Regional waters flow to the Chesapeake Bay, Great Lakes, and Atlantic Ocean. Plentiful water resources along with rich soils combine to create optimal farming conditions in some portions of the Region. Water quality in the Region is generally considered to be satisfactory to good, although nine water bodies are on the State's most recent List of Impaired/TMDL Waters List (see TABLE 22). In general, water quality issues can be traced to non-point source pollution, sewer overflows, discharges from onsite septic and wastewater treatment systems, and flooding. Extreme flood events in 2006 and 2011 devastated four of the Region's eight counties and numerous smaller floods have caused localized damage. Therefore, waterways evoke both positive and negative images in the Southern Tier.

TABLE 22 ■ Southern Tier Impaired Waters on 303(d) List¹¹¹

Category	Waterbody Name	County	Type of Waterbody	Pollutant	Year
1	Smith Pond	Steuben	Lake	Phosphorus	2008
1	Whitney Point Lake/Reservoir	Broome	Lake	Phosphorus	2002
1	Owasco Inlet, Upper, and Tributaries	Tompkins	River	Phosphorus	2008
1	Cayuga Lake, Southern End	Tompkins	Lake	Pathogens	2008
1	Cayuga Lake, Southern End	Tompkins	Lake	Phosphorus	2002
1	Cayuga Lake, Southern End	Tompkins	Lake	Silt/Sediment	2002
1	Fly Pond, Deer Lake	Broome	Lake	Phosphorus	2010
2b	Koppers Pond	Chemung	Lake	PCBs	1998
2b	Trout Creek, Upper, and Tributaries	Delaware	River	PCBs	2002
3b	Canisteo River, Middle, and Minor Tributaries	Steuben	River	Unknown Toxicity	2008
3b	Minor Tributaries to Lower Susquehanna (North)	Broome	River	Phosphorus	2010

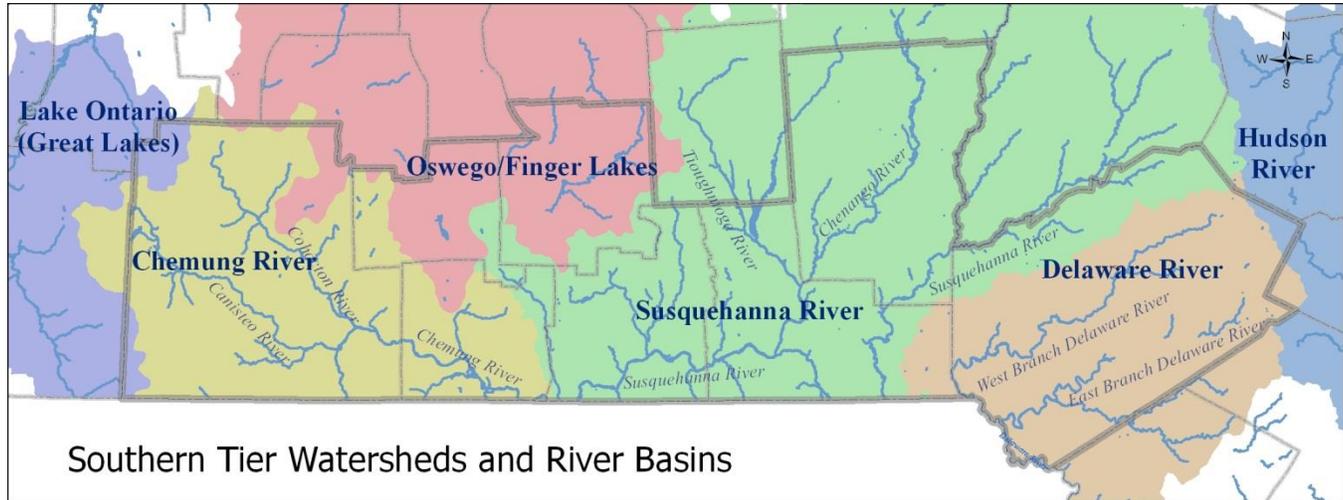
The residents of rural areas get their drinking water from wells and use septic systems for wastewater treatment. Some small cities and denser suburban towns are served by centralized water and wastewater facilities, and there are many smaller community water systems that provide water from wells to mobile home parks, campgrounds, and clusters of houses.

Water Features

The Southern Tier lies primarily within the boundaries of four watersheds: the Susquehanna River Watershed, Chemung River Watershed, Delaware River Watershed, and Oswego River/Finger Lakes Watershed.

¹¹¹ Lake Salubria, in Steuben County, was on the Impaired Water Bodies List until a TMDL plan was developed. Keuka Lake, partially located in the Southern Tier Region, is on the List as well, but for Yates County.

FIGURE 21 ■ Southern Tier Watersheds and River Basins



Southern Tier Watersheds and River Basins

The Susquehanna River is the preeminent water body in the Southern Tier. It is a truly regional waterway, traversing or touching five of the eight Southern Tier counties. The Chemung River joins with the Susquehanna River just south of Waverly at the Pennsylvania border. This combined watershed holds significance beyond the Region; it is one of the largest watersheds in the United States and provides about half of the freshwater to the Chesapeake Bay.¹¹² The Susquehanna River provides drinking water to more than 6.2 million people in New York, Pennsylvania, and Maryland.¹¹³ Because the Chesapeake Bay is impaired, significant regulations have been established to help protect and restore water quality in the Bay. These require reduction of nutrient and sediment pollution from sewage treatment plants, agriculture, and urban runoff throughout the watershed.

Although the water quality in the New York portion of the watershed is generally good, NYSDEC, in coordination with the Upper Susquehanna Coalition¹¹⁴ has developed a Watershed Implementation Plan calling for additional pollution reductions to meet Federal requirements. The Susquehanna River has high levels of nutrients and sediments from various sources, including runoff, sewage treatment plants, and agriculture.¹¹⁵ As a result, significant regulations have been passed to help protect and restore the watershed.



The Delaware River Watershed, which covers areas in New York, Pennsylvania, New Jersey, and Delaware, flows into the Delaware Bay and eventually to the Atlantic Ocean. The Delaware River is also of interest beyond the Southern Tier as it serves as the primary source of drinking water for New York City's public water supply,¹¹⁶ and therefore, its watershed is strictly regulated by the NYC Department of Environmental Protection.

¹¹² Pennsylvania Fish & Boat Commission, <http://www.fish.state.pa.us/watertrails/susqmid/trailguide.htm>.

¹¹³ Susquehanna River Basin Commission, <http://www.srbcc.net/stateofsusq/did-you-know.htm>

¹¹⁴ The Coalition is comprised of state-designated Soil and Water Conservation Districts (16 in New York and 3 in Pennsylvania), and works "to protect and improve water quality and natural resources in the Upper Susquehanna River Basin with the involvement of citizens and agencies through planning, education, coordination, funding, project implementation and advocating for our water resources."

¹¹⁶ "Water Supply and Sewage Disposal Systems in the Southern Tier East Region" Southern Tier East Regional Planning and Development Board, 2009, Available online at: <http://www.steny.org/usr/Publication/FINAL%20WS%20REPORT%20WITH%20TOC.pdf>

The Oswego River/Finger Lakes Watershed, including most of Schuyler and Tompkins and parts of Chemung and Steuben Counties, drains northward into Lake Ontario. This is one of the largest watersheds in NYS; the Finger Lakes and other smaller lakes make up about six percent of the total surface area of this watershed.¹¹⁷

TABLE 23 ■ Southern Tier Watersheds¹¹⁸

Susquehanna River Watershed	
Location and Area	The Susquehanna River's 444 miles drain a watershed of 27,500 square miles that covers large portions of New York, Pennsylvania, and Maryland. Excluding the Chemung River Watershed, this watershed covers 4,520 square miles within New York State and covers most of Broome, Chenango, and Tioga Counties and smaller portions of Delaware, Chemung, Schuyler, and Tompkins Counties
Major Tributaries	<ul style="list-style-type: none"> ■ Chenango, Tioughnioga, and Unadilla Rivers ■ Owego Creek
Water Quality	More than 87% of rivers that were assessed had good or satisfactory water quality, though 12% were found to have poor quality. Of lakes assessed, 84% were deemed to be of good or satisfactory quality.
Threats and Challenges	<ul style="list-style-type: none"> ■ Nonpoint sources of pollution ■ Municipal wastewater and combined sewer overflow in Binghamton-Johnson City area ■ Onsite septic and rural community wastewater treatment ■ Flooding impacts
Chemung River Watershed	
Location and Area	This watershed covers 2,600 square miles – 1,740 of which are in New York State – and includes most of Chemung and Steuben Counties, as well as a portion of southwestern Schuyler County.
Major Tributaries	Cohocton, Tioga, and Canisteo Rivers
Water Quality	Nearly 98 percent of rivers that were assessed had water of good or satisfactory quality, though over 90 percent of lakes assessed had poor water quality
Threats and Challenges	<ul style="list-style-type: none"> ■ Agricultural and other nonpoint sources of pollution ■ Flooding impacts ■ Protection of municipal water supply in Elmira area
Delaware River Watershed¹¹⁹	
Location and Area	This watershed covers most of Delaware County as well as a portion of Broome County and small parts of Chenango County. It includes nearly 2,400 square miles of land area, with more than 4,000 miles of freshwater rivers and streams.
Major Tributaries	<ul style="list-style-type: none"> ■ East and West Branches of the Delaware River ■ Neversink and Mongaup Rivers
Water Quality	Over 97% of all assessed rivers had good or satisfactory water quality but nearly 100% of all assessed lakes in the watershed have poor water quality
Threats and Challenges	<ul style="list-style-type: none"> ■ Acid rain ■ Atmospheric deposits of mercury ■ Protection of New York City Water Supply Reservoir
Oswego River/Finger Lakes Watershed	
Location and Area	This watershed covers more than 5,000 square miles of land in New York, including most of Tompkins and Schuyler Counties and smaller parts of Chemung and Steuben Counties.
Major Tributaries	<ul style="list-style-type: none"> ■ Oneida and Clyde Rivers ■ Cayuga and Seneca Lake tributaries
Water Quality	Nearly 90% of rivers and 85% of lakes that were assessed were found to have good or satisfactory quality
Threats and Challenges	<ul style="list-style-type: none"> ■ Nonpoint sources of pollution ■ Protection of Finger Lakes resources, including drinking water and recreational uses

Water Quality

Assuring the water quality of surface water and groundwater supplies in the Region is critical to all users. Rural residents who use individual wells and public and community water systems that draw water from aquifers

¹¹⁷ New York State Department of Environmental Conservation, <http://www.dec.ny.gov/lands/48023.html>.

¹¹⁸ Unless otherwise noted, watershed-specific facts and conditions are from the New York State Department of Environmental Conservation (DEC) Watershed information resources, available at: <http://www.dec.ny.gov/lands/60135.html>.

¹¹⁹ <http://www.dec.ny.gov/lands/48372.html>

depend on high quality, abundant groundwater resources. Excellent water quality is also necessary to support the Region's fish and aquatic populations as well as other wildlife and plants. Several of the Southern Tier's rivers are considered to have world-class trout fishing, along with walleye, bass, and muskellunge. Additionally, high water quality is important for tourism and recreational opportunities along the many rivers and lakes of the Region. The Southern Tier's water resources are a draw, offering scenic and active water-based activities, such as boating, paddling, and swimming, that enhance the villages and cities nestled nearby.

Water and Wastewater Infrastructure

Significant wastewater treatment system upgrades and water infrastructure improvements, while costly, are needed to replace aging pipes and systems and to integrate energy efficiency and renewable technologies into facilities. Treating and transporting water and wastewater is an energy-intensive process that contributes to GHG emissions. Nationally, the energy used to treat water and wastewater accounts for up to 35 percent of a municipality's energy budget. Per NYSERDA, energy use accounts for 25 to 40 percent of the operating budgets for wastewater utilities and about 80 percent of the cost of drinking water processing and distribution.¹²⁰ In the Southern Tier, there are approximately 40 water supply plants that serve over 2,000 people per plant, and approximately 50 wastewater treatment plants having a capacity of 500,000 gallons or more per day. Of course, the largest public water supply in the Southern Tier serves the City of New York. Delaware County reservoirs supply a significant portion of the City's usage of over 100 million gallons per day.

Retrofitting or constructing new water and wastewater infrastructure presents multiple opportunities for energy savings by integrating energy efficiency and renewable technologies into facility operations and processes, incorporating waste feedstocks into energy processes, and including green infrastructure and low impact development practices. Together, these changes can make significant reductions in local energy and GHG emissions. Currently, New York State offers several funding opportunities that can facilitate these expensive capital projects, such as NYSERDA's Biogas Program, Existing Facilities Program, and New Construction Program, as well as technical assistance available through NYS's Environmental Facilities Corporation.

Issues and Opportunities

Overall, the Southern Tier has good water quality and an abundant water supply that supports a variety of uses and community needs. However, land use patterns, resource extraction, and pollution threaten these resources. Opportunities exist for expanding public access to lakes and rivers, improving water quality in impaired water bodies, and implementing energy-efficient water and wastewater facility management.

Issues

Poorly planned development that includes extensive impervious surfaces, particularly in sensitive areas such as floodplains, steep slopes, and along streams, has substantially interfered with the hydrologic cycle. This inhibits the natural ability of the watershed's wetlands, soils, and vegetation to absorb stormwater, replenish water resources, and filter pollutants. Farmland in the Region also has the potential to generate water pollution. Poor farm management practices can allow fertilizers, animal wastes, sediments, and other contaminants to enter nearby streams and rivers.

Much of the Southern Tier is still recovering from two extreme flood events that occurred within a 6-year period. New development and redevelopment in floodplains needs to be avoided and, where necessary, better designed to protect human and environmental health and minimize losses due to floods. This is particularly challenging in many of the Region's historic population centers located along major waterways. Strategies for urban revitalization need to be cognizant of this potential conflict.

¹²⁰ "Statewide Assessment of Energy Use by the Municipal Wastewater Sector." New York State Energy Research and Development Authority. Final Report No. 08-17. 2008. Available online at: http://www.nyserda.ny.gov/~media/Files/EERP/Commercial/Sector/Municipal%20Water%20and%20Wastewater%20Facilities/nys-assess-energy-use.aspx?sc_database=web

Resource extraction, such as forestry, mining, and gas drilling, are expanding industries in the Southern Tier. The Region sits on top of some of the largest natural gas deposits in the world – extraction of which poses potential risks to water quality and water supply if not properly regulated and controlled. Traditional drilling methods have the potential to contaminate water resources and more recently concerns have been raised about the proposed use of the controversial high-volume hydrofracturing (HVHF) technique to extract natural gas, also known as fracking.¹²¹ HVHF uses a mixture of water, chemicals, and small particles to create fractures in a rock formation to release natural gas. The use of HVHF is under regulatory review by State agencies and a Federal study is underway to assess impacts on water quality. The HVHF process requires large amounts of water and produces a byproduct that, if not disposed of or treated properly, could contaminate local water resources. State agencies are considering these potential risks in their review of this activity. Under the most recent draft SGEIS prepared by the NYSDEC, each permit applicant would be required to submit a plan for disposal of wastewater. In some cases, a back-up plan must also be included. If an acceptable disposal plan is not submitted, the drilling permit would not be issued. The gas production “fairway,” the portion of the formation most likely to support HVHF activities, covers the majority of the Region.

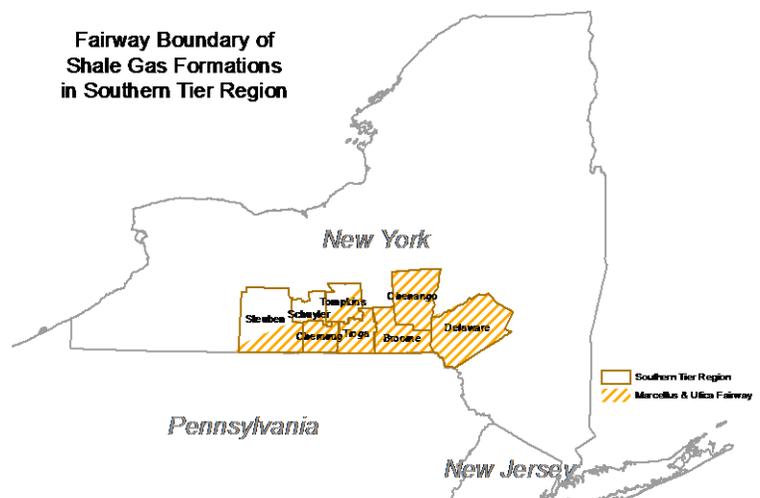
Like infrastructure systems nationwide, many of the Region’s water and wastewater facilities are outdated and require upgrades, including energy efficiency improvements. Limited funding and large capital expenditures required to retrofit or develop new facilities are a major barrier to modernizing water and wastewater facilities. Additionally, while no facilities in New York are currently permitted to accept wastewater from high-volume hydrofracturing, some New York wastewater treatment plants could receive requests to treat wastewater from the HVHF process, which will contain a number of chemicals that are not usually found in wastewater. Under existing NYSDEC rules, all chemical constituents of the wastewater would be disclosed to the facility through a headworks analysis. The headworks analysis evaluates all of the pollutants present in the wastewater against the capabilities of the treatment system and assesses any potential adverse impacts to the treatment system process and any effects on the receiving water. However, these facilities may not have the proper means for safely treating and disposing of this fluid, in which case they would not be authorized by NYSDEC to receive the wastewater.

In addition, the Chesapeake Bay total maximum daily load (TMDL) is expected to create fiscal challenges for communities throughout the Region when they are required to upgrade sewage treatment plants to meet the EPA standard. These barriers can be overcome through outreach and education to utility district boards and operators and strategic planning for upgrades over time. Additionally, these types of improvements lend themselves to implementation through performance contracting or a revolving loan fund, both of which could help system operators with high upfront costs.

Opportunities

The Southern Tier can celebrate its beautiful waterways by creating strong connections to nearby neighborhoods and communities, developing more water recreation opportunities, and supporting activities that enhance the quality and raise the awareness of this regional resource. Education of municipal leaders and

FIGURE 22 ■ Fairway Boundary



¹²¹ The Southern Tier’s Approach To Economic Growth: Catalytic, Collaborative, Comprehensive, Competitive. Regional economic Development Council of the Southern Tier. 2011. Available at <http://www.nado.org/wp-content/uploads/2012/07/SouthernTier.pdf>

the public will facilitate changes in expectations and behavior. Adopting and enforcing regulations that control development within floodplains, on steep slopes, and next to streams will help to clean up our waterways.

The Region can capitalize on and support the efforts of the many organizations and advocacy groups that are active in the Southern Tier, including: County Water Quality Coordinating Committees, Finger Lakes/Lake Ontario Watershed Protection Alliance, Susquehanna River Basin Commission, Upper Susquehanna Coalition, Chesapeake Bay Gateways Network, Friends of the Chemung River Watershed, Upper Susquehanna Conservation Alliance, and others. Community volunteers are a largely untapped resource, and training community water quality monitors can assist in gauging current and emerging water quality concerns as well as inform the larger public about the importance of water quality.

The NYSDEC's new protocols to address water pollution through its State Pollution Discharge Elimination System process offers an opportunity for planning boards, highway departments, and inspection officers to be trained in up-to-date requirements for stormwater controls and water pollution. The Region has the chance to become a leader in water quality management by focusing on improving the quality of the limited number of water bodies in the Southern Tier that are currently cited by the NYSDEC as being impaired.

Priority Actions identified for water resources were derived from successful and innovative programs such as:

- **The Elmira Country Club** will work with Chemung County and other stakeholders to capture the Club's runoff, which is loaded with herbicides and fertilizers that enter and contaminate the Chemung River. Nearly all of that contaminated water can be captured and recycled through the Club's irrigation system, and the club has an interest in doing so because it spends over \$40,000 per year for potable irrigation water.¹²²
- **Susquehanna-Chemung Action Plan.** STC worked with partners across the watershed and used an ecosystem-based management approach to develop a comprehensive strategy for conserving and protecting water resources. Its recommendations include:
 - Expand the efforts of public health departments to provide homeowners and contractors with information about the installation and maintenance of septic systems. Include information about the long-term cost savings from proper maintenance, which reduces the potential need for costly replacement projects.
 - Continue the Schuyler County program to cost-share replacement of failing or antiquated septic system components. Explore other kinds of incentive programs to promote upgrading of existing systems.
 - Provide assistance and support for development and implementation of source water and wellhead protection plans. This can include grants, workshops, guidance documents, technical assistance, and establishment of spill detection and early warning systems.
 - Conduct an analysis of the watershed's public road systems to identify areas where retrofit stormwater management practices have the potential for providing cost-effective nutrient reductions for the Chesapeake Bay TMDL.
 - Lobby for the inclusion of green infrastructure in the streetscape portion of NYS Main Street grants and increased credit for green infrastructure practices in the LEED certification program.
 - Maintain and improve Susquehanna River Basin Commission (SRBC) and NYSDEC water quality monitoring and assessment programs.
- **Upper Susquehanna Coalition Wetland Program.** The Upper Susquehanna Coalition (USC) has developed a Multiple Barrier Approach for planning and implementing wetland restoration projects on a watershed basis.
- **Ithaca Area Wastewater Treatment Plant** recently announced it will reduce its net energy use by 70 to 75 percent through installation of multiple energy efficient plant and equipment upgrades. This is a joint effort being undertaken by several municipalities and is being managed by Johnson Controls through a performance contract.

¹²² from Susquehanna-Chemung Action Plan ppt - www.stcplanning.org/usr/Program_Areas/Water_Resources/Susquehanna-Chemung_Action_Plan/SCAP_Mtg_2010_04_06_revised%20after%20meeting.pdf

- **The Community Science Institute Volunteer Monitoring Program** mobilizes and trains interested community participants to monitor the health of both Cayuga Lake and streams in the Region.

A Southern Tier Example

Ithaca Area Wastewater Treatment Plant¹²³

The Ithaca Area Wastewater Treatment Plant (IAWWTP) signed an energy performance contract with Johnson Controls in 2009 to cut energy costs, achieve GHG emission reductions, make capital upgrades, and improve the plant's energy efficiency and reliability. The project is a joint effort among the City of Ithaca, Town of Ithaca, and Town of Dryden and is being supported in part by grants from NYSERDA and the Federal American Recovery and Reinvestment Act.



Retrofits to the facility include a co-generation system upgrade, HVAC improvements, new lighting, and the installation of PV solar panels. The project team estimates the retrofits will cost approximately \$8 million, but that over the next 20 years, the savings will be approximately \$9.8 million, resulting in 100 percent cost recovery plus an additional savings of \$1.8 million over that timeframe. The team also projects GHG emissions reductions of approximately 997 tons, representing 70-75 percent of the plant's total emissions. A key component of the project has been enhancing the IAWWTP's ability to produce energy from the conversion of organic wastes that come from within the plant.

While the cost savings from increased energy efficiency and the environmental benefits from GHG reduction are clear, other environmental and economic benefits result from these retrofits as well. Because the IAWWTP is a shared facility among the Town and City of Ithaca and Town of Dryden, the retrofits provide cost savings for customers in all three municipalities. It also marks a positive outcome for joint municipal coordination around sustainability. This project also has creative waste reduction strategies, using the plant's own waste conversion to generate energy and incorporating additional community waste streams from nearby agricultural and brewing businesses as well as university dining hall and animal carcass waste feedstocks that improve biogas production. This re-use strategy saves money for local businesses by avoiding landfilling costs, reduces potential methane emissions from organic materials in landfills, provides additional fuel for plant operations, and improves system operations by introducing high-value materials like brewing hops waste when the waste flow is low to help plant managers maintain the digestion process. In 2013, the IAWWTP will begin tackling the issue of how to locally dispose of the biosolids (residual material from the wastewater treatment process) from the plant.

¹²³ Source: <http://www.ci.ithaca.ny.us/departments/dpw/water/iawwtp.cfm>

Strategy for the Future

Investments in green, energy efficient water and wastewater infrastructure serving population centers are critical to lowering the environmental impact and GHG emissions that result from processing and distributing water and treating wastewater. Maintaining and improving water quality is critical to the health of society, the environment, and regional sustainability.

Goals

14. **Efficiently manage and upgrade existing water, sewer, and other utility infrastructure to support compact development and reduce energy use.**
15. **Improve and protect water quality and quantity.**

These two goals were selected for Water Management in recognition that the Region has significant lakes and rivers in its boundaries and that extension of services can draw development from the historic centers which this Plan is working to enhance and strengthen. In addition, more efficiently managing public infrastructure can provide significant reductions in energy use.

Indicators and Targets

Tracking the energy used by water and sewer utilities will help show progress in improving the efficiency of infrastructure. While data are not currently available for most such systems, over time, as plant operators realize the fiscal benefits of improving energy efficiency, data should become more readily available. Decreasing the number of impaired water bodies will help to improve water quality throughout those watersheds, improving and protecting water quality in numerous rivers, streams, and lakes.

Six priority actions were identified through the Cleaner Greener Southern Tier planning process, based on technical analysis, stakeholder support, feasibility, and greatest GHG reduction potential. The selected target would result from a variety of regional efforts to address water quality, including better understanding of the systems that affect water quality, implementing steps to manage stormwater better, and coordinating efforts to focus on already impaired water bodies – all recommended actions. Other recommended actions are geared to the first goal of efficiently managing infrastructure and supporting compact development. In order to quantify the GHG emissions reductions that may be expected, assumptions were made about the anticipated implementation of each action over the next 20 years. By 2032, the Southern Tier can expect to reduce GHG emissions by 7,000 MTCO₂e by implementing these actions. This represents an 11 percent reduction in emissions from 2010 levels in the water sector, and a less than one percent reduction in the overall GHG emissions for the Region. GHG emissions reductions from actions designed to improve and protect water quality and quantity cannot be quantified. They would likely improve water quality and reduce the intensity of water treatment, but the net effect on GHG emissions of these policies is difficult to quantify at this time. It is assumed that all of these priority actions will need to be implemented to achieve these goals and targets over the Plan's 20-year timeline. Other supporting actions can be found in the Supplemental Actions list in the Appendix.

Taking Action

The following six actions were determined to be the most important water management-related actions for the Region to focus on. The assumptions used to calculate GHG reduction potential, and the expected GHG reduction for each relevant action, are detailed in the Implementation Strategy in the Appendix. Some actions are also related to the REDC Strategy; these are also noted in the Implementation Strategy. There is also more detail about the actions marked **TOP 22** at the beginning of this Plan.

INDICATORS

Energy use by water and sewer utilities per million gallons supplied or treated.

Baseline (2010)

Data not currently available.

Total Number of Impaired Waters.

Baseline (2010)

9 waterbodies

Targets

Long Term (20 year): 66 percent reduction (3 waterbodies)

Short Term (5 year): 11 percent reduction (8 waterbodies)

▶ **50. Incorporate energy efficiency, renewables, and advanced controls into policies for new equipment, new plants, and plant upgrades**

Goal Supported: 14

Description: Most water and wastewater treatment plants have evaluation criteria that they must follow when purchasing new equipment and performing retrofits. Policies should be established that require consideration of energy efficiency, renewable energy, and long-term operating costs of equipment in these criteria, so that advanced controls, energy system and process upgrades, and control monitoring equipment can be promoted for energy and cost savings. Due to lack of awareness of the need for and benefits of updating policies, this may require board member and operator education to support getting policies passed and budgets established for improvements.

Potential Leads: Possible leads for this action include regional and county planning agencies and municipalities.

▶ **TOP 22 51. Perform energy audits and install retrofits at major water and wastewater facilities**

Goal Supported: 14

Description: Water and wastewater treatment processes use large amounts of energy. Nationally, the energy used to treat water and wastewater can account for up to 30-35 percent of a municipality's energy budget.¹²⁴ According to the EPA, potential energy savings at these facilities of 15-30 percent are "readily achievable" and have payback periods of between a few months and a few years.¹²⁵ Targeting the least efficient plants and implementing energy efficiency retrofits reduces both energy consumed and GHGs emitted. Given that these facilities are typically older and require periodic improvements, communities can plan for those upgrades and significantly reduce their energy bills when improvements are made. Opportunities for reducing energy use in water and wastewater facilities include sealing building exterior areas to reduce energy losses, upgrading lighting, replacing equipment, incorporating renewables, and improving operations. Two specific processes that lend themselves to energy upgrades in water and wastewater facilities are aeration and pumping systems. Aeration is the procedure that introduces oxygen into treated water and is one of the most energy-intensive parts of water treatment processes. Installing control equipment that monitors dissolved oxygen and turns on the aeration pumps only as needed can reduce energy use significantly. Pumping systems also require a lot of energy. Upgrades can be made to the pumping system to minimize water distribution during peak times, improve the efficiency of the pumps, motors, and other processing equipment, and automatically regulate the pumping and other processes in a plant. Installing more efficient pumping systems and sensors can produce energy savings of 20 percent or more. Upgrades to treatment facilities can be expensive. A revolving loan fund, paid back through savings, could help system operators with these initial payments.

Potential Leads: Raising awareness on the issues related to water and wastewater treatment energy use could be undertaken by regional planning boards or councils of governments.

▶ **52. Develop new distribution system repair, replacement, and expansion policies that prioritize repair/replacement rather than expansion of service areas**

Goal Supported: 14

Description: Modeling and analyses have been conducted around the country to analyze the financial impacts of sprawling vs. compact development, and the cost savings are significant. The cost to serve compact development close to a centrally located water/wastewater plant is about half that of distribution

¹²⁴ U.S. Environmental Protection Agency, "Energy Efficiency: On the Road to Net Zero Energy," <http://www.epa.gov/reg3wapd/infrastructure/EnergyEfficiency/>; Lampman, Gregory, Kathleen O'Connor and Amy Santos, "NYSERDA and Strategic Energy Management at Municipal Wastewater Treatment Facilities," <http://www.nywea.org/clearwaters/08-1-spring/04-NYSERDA.pdf>.

¹²⁵ U.S. Environmental Protection Agency, "Energy Efficiency for Water and Wastewater Utilities," <http://water.epa.gov/infrastructure/sustain/energyefficiency.cfm>.

for highly dispersed development located far from the water service center.¹²⁶ Since there is a tendency in most municipalities to continue ‘business as usual’ development policies, education of board members and operators will be needed. This action calls municipalities to review current policies to be sure that they encourage compact development and growth in areas where the distribution system already exists, in order to avoid the costs associated with far-flung, costly infrastructure. This analysis is also required for any state-funded projects under the 2010 Smart Growth Public Infrastructure Priority Act, which directs New York State agencies to make infrastructure spending decisions in accordance with smart growth principles. To encourage growth in already-developed service areas, municipalities can provide funding for the upgrades to water systems that maintain their current boundaries.¹²⁷ Updated policies should also address INI (inflow and infiltration) and the importance of collection and distribution systems to INI mitigation, as well as improvements to metering and sub-metering systems.

Potential Leads: Possible leads for this action include regional planning boards or councils of governments.

▶ **53. Expand education, outreach and pilot projects for green infrastructure and Low-Impact Development practices**

Goal Supported: 15

Description: Several Southern Tier organizations already promote community education and outreach and encourage local governments to become involved in water quality efforts. However, more education, training, and staff are needed to support and enforce current stormwater permit requirements (for construction activities and “urban area” municipalities), local water quality objectives, and Chesapeake Bay restoration. Significantly more implementation funding is also needed to construct retrofit projects that address drainage problems associated with existing development. Counties could seek funding to foster a citizen based watershed ethic and promote water quality protection programs with local governments, such as provided by the Chesapeake Bay program. Broome County is working toward installing pervious pavement in the parking lot and the Garden of Ideas at the TechWorks! Museum of Invention and Upstate Industry, which will help the public see firsthand the benefits of replacing asphalt parking lots. Binghamton has a sustainable development planner and is updating land use regulations and codes to promote sustainable practices. Tompkins County has taken steps towards completing aquifer studies county-wide and establishing a Community Science Institute volunteer water quality monitoring program¹²⁸ and a floating educational classroom on Cayuga Lake.

Potential Leads: Possible leads for this action include regional planning boards or councils of governments.

▶ **54. Develop program and guidelines to improve stormwater drainage design and maintenance for rural roadways**

Goal Supported: 15

Description: Water quality could be improved if best practices were instituted for the construction and maintenance of rural roadways in the Southern Tier that run along streams. These projects often result in narrower floodplains and the need to harden stream banks to protect the road, which can contribute to further destabilization of the stream via erosion and sedimentation. County Soil and Water Conservation Districts and Cornell Cooperative Extension can work with roadway maintenance agencies to develop improved construction and maintenance standards. While roadway construction projects typically require compliance with general NYSDEC SPDES stormwater permits for linear projects, additional design and management measures can further enhance water quality protection. One barrier is lack of funding for technical assistance and project construction grants. Pennsylvania’s Dirt and Gravel Road Program addresses roadway drainage issues through research, technical bulletins, assessment of current conditions, technical assistance by Conservation Districts, training of highway department staff, and grant funding for priority

¹²⁶ Spier, Cameron and Kurt Stephenson, 2002. “Does Sprawl Cost Us All? Isolating the Effects of Housing Patterns on Public Water and Sewer Costs.” *Journal of the American Planning Association* 68(1): 59-70.

¹²⁷ “Growing Toward More Efficient Water Use: Linking Development, Infrastructure, and Drinking Water Policies.” EPA, 2006, Available online: http://www.epa.gov/dced/pdf/growing_water_use_efficiency.pdf

¹²⁸ Tompkins County-Wide Water Quality Monitoring Initiative. Available at http://www.communityscience.org/?page_id=25

problem sites. A new Southern Tier program could take a similar approach, building on work that NYSDOT, Conservation Districts, CCE, and counties are already doing. The program could also promote the increased use of vegetative buffers along roadways to enhance natural drainage and filtration of contaminants, along with hydroseeding of roadside ditches after they are cleaned (several Southern Tier counties already have hydroseeding programs for this purpose). Road maintenance activities in more developed areas could also prioritize the collection and removal of road debris on a periodic basis through street sweeping as well as curb and storm drain debris removal. Limitations on the amount of road salts applied to rural roadways and the storage of salts for snow removal during the winter season could also be implemented.

Potential Leads: Possible leads for this action include regional planning boards, councils of governments, or Cornell Local Roads Program.

▶ **55. Support regular updates and implementation of local and county water quality strategies and plans**

Goal Supported: 15

Description: Non-point source pollution originates from diverse sources across the landscape, including construction, road maintenance, and agriculture. Most Southern Tier counties have active Water Quality Coordinating Committees that have developed and implemented strategies for protecting and improving water quality. In addition, municipalities in the Binghamton, Elmira, and Ithaca areas have established stormwater programs in compliance with Municipal Separate Storm Sewer System (MS4) permits. Chemung, Schuyler, and Steuben Counties have also established the Rural Stormwater Coalition to promote improved stormwater management. Additional implementation funding and regular updates of these various strategies can promote a variety of local water quality improvement activities.

Potential Leads: Technical support can continue to be provided by county Soil and Water Conservation Districts, Southern Tier Central Regional Planning and Development Board, and others. Counties without active Water Quality Coordinating Committees or existing stormwater programs could develop local plans and ordinances that address specific water quality issues, such as high nutrient loads from agricultural activities, sediment loads from new development, and urban runoff from towns and roadways. A good example to work from is Syracuse's successful "Save the Rain" program.

WASTE MANAGEMENT

Waste management practices influence up to 40 percent of GHG emissions in the U.S.¹²⁹; therefore regional action on waste management in the Southern Tier is vital to meeting the New York State emissions reduction targets. Per capita waste generation is relatively low in the Southern Tier and for the most part solid waste departments throughout the Region have implemented best management practices. Counties in the Southern Tier are responding to State regulations by assessing ‘upstream’ waste generation and implementing local policies. However, some significant issues remain; this chapter identifies opportunities and outlines implementation actions necessary to meet the regional goal for waste management:

16. Promote innovative waste reduction and management strategies that reduce the amount of material disposed of at landfills.

Waste management is deeply tied to concerns about climate, sustainability, and conservation. The importance of waste management in improving the environment is already part of the public consciousness, due to campaigns like “Reduce, Reuse, Recycle.” When considering waste in the context of sustainability, it is important to think broadly about issues such as finite raw materials, buying locally, developing local businesses to handle and process reusable materials, and identifying opportunities to generate local energy from materials now considered waste. Waste that is not recycled or composted must be transported to landfills for disposal, contributing GHG emissions associated with transport, as well as through the methane generated when waste degrades in a landfill.

Landfill gas emissions generation account for only 2 percent of GHG emissions in the Southern Tier. However, fully accounting for GHG emissions influenced by solid waste management from a life cycle perspective is notoriously difficult, with waste transport emissions falling under the transportation sector and product life-cycle analysis typically being treated separately due to the inherent complexities of making such calculations.

Snapshot of the Region Today

The Southern Tier counties are organized into county-level “planning units,” which delineate high-level management strategies implemented by numerous public and private entities within the Region. Counties manage waste through landfilling, recycling, and composting. Depending on the county, waste is collected by a combination of private haulers, self-haul, and municipal collection. However, substantial differences in practices exist at the local level. Furthermore, planning unit-level waste tracking is complicated by the inbound and outbound flows of waste; some counties lack landfill space and ship their waste outside to an adjacent county, or even another state—while other planning units import waste.

The majority of areas in the Southern Tier follow standard waste disposal protocols. Many of the solid waste services were centralized in the 1970s to provide regional, comprehensive approaches to the disposal of solid waste, such as the availability of countywide recycling and composting services, county-owned landfills, municipally-owned biowaste composting facilities, and construction and demolition debris recycling facilities.

In 2010, Southern Tier residents disposed of 4 pounds of municipal solid waste (MSW) per person per day¹³⁰—less than the EPA reported average disposal rate for the United States of 4.3 lbs/person/day¹³¹ in 2010, and similar to the New York State MSW disposal average of 4.1 lbs/person/day.¹³²

¹²⁹ Beyond Waste: Full Report.” NYS Department of Environmental Conservation, 2010, p.4, based on U.S. EPA “Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices”, 2009, p. 22.

¹³⁰ Based on disposal rate information from three Southern Tier counties.

¹³¹ “Facts and Figures: 20008”, Environmental Protection Agency, 2009.

¹³² Beyond Waste: Full Report.” New York State Department of Environmental Conservation, 2010, http://www.dec.ny.gov/docs/materials_minerals_pdf/frptbeyondwaste.pdf

The Southern Tier Region generates an estimated 618,000 short tons of waste annually,¹³³ and in 2008, it diverted nearly 94,600 short tons.¹³⁴ Tioga and Tompkins Counties are among the leaders in waste diversion in the State. For instance, the initiatives of the Tompkins County Solid Waste Division have resulted in a 60 percent waste diversion rate with a goal of 70 percent by 2015. By comparison, the statewide municipal solid waste recycling rate in 2008 was 20 percent, and the total recycling rate was 36 percent.¹³⁵

The largest shares of materials in MSW disposed in New York State are paper, organics (e.g., food waste and yard trimmings), and plastics. Metals, textiles, wood, glass, and other fractions make up the remaining 30 percent. After MSW, construction and demolition (C&D) waste is the largest waste stream in the Region. Additionally, the Southern Tier imports C&D waste from other regions in New York, as it has four of the state's 12 C&D landfills. The Southern Tier recycled nearly 95,000 short tons of C&D waste in 2008.¹³⁶

Counties are guided by programs developed at the State level that emphasize reducing waste generation through a “shift from focusing on ‘end-of-the-pipe’ waste management techniques to looking ‘upstream’ and more comprehensively at how materials that would otherwise become waste can be more sustainably managed through the state’s economy.” The State supports developing revenue-generating programs to achieve materials management goals such as solid waste disposal fees, plastic bag fees, and permit fees. The State also endorses pay-as-you-throw programs as ways to create financial



incentive for consumers to waste less and recycle more, and targets material reuse and organics, including donating food to food banks or as animal feed, and composting. The State promotes enforcing recycling requirements in all sectors, including business, institutions, construction and demolition, and industry, and clarifies reuse is preferable to recycling, composting and organics recycling are equivalent to recycling, and product stewardship is the preferred approach.¹³⁷

New York State has passed laws requiring certain actions be taken and the Southern Tier municipalities have responded accordingly. New York State:

- Requires residents have access to “free and convenient” electronics waste recycling. The Southern Tier has numerous e-waste collection events and drop-off points.¹³⁸
- Requires planning units in the State to develop Local Solid Waste Management Plans in order to receive permits for their solid waste management facilities. As of October 2010, five of the eight counties in the Southern Tier had expired Local Solid Waste Management Plans, though many have now updated them, or are in the process of updating them, including Broome, Chemung, Tompkins, and Delaware Counties.
- Bans landfilling yard waste and recyclable materials.

¹³³Waste generation was estimated for the Southern Tier by assuming that waste generation is similar to the New York State average of 5.15 lbs MSW per capita per day. The New York State average MSW generation rate is taken from Beyond Waste: Full Report.” New York State Department of Environmental Conservation, 2010, http://www.dec.ny.gov/docs/materials_minerals_pdf/frptbeyondwaste.pdf.

¹³⁴ Beyond Waste: Full Report.” New York State Department of Environmental Conservation, 2010, Appendix C. http://www.dec.ny.gov/docs/materials_minerals_pdf/frptbeyondwaste.pdf

¹³⁵NYDEC 2012, p. 19.

¹³⁶ “Beyond Waste: Full Report.” New York State Department of Environmental Conservation, 2010, Appendix C. http://www.dec.ny.gov/docs/materials_minerals_pdf/frptbeyondwaste.pdf

¹³⁷ “Beyond Waste: Full Report” New York State Department of Environmental Conservation, 2010, p. 1. http://www.dec.ny.gov/docs/materials_minerals_pdf/frptbeyondwaste.pdf

¹³⁸ “E-waste Recycling.” New York Department of Environmental Conservation, <http://www.dec.ny.gov/chemical/65583.html>

TABLE 24 ■ Key Waste Programs and Facilities in the Region

County	MSW Landfills	Dedicated C&D Landfills	Industrial Waste Landfill	Municipal Curbside Recycling Programs ¹³⁹	Single Stream Recycling	Composting Facilities	Landfill Gas-to-Energy	Pay-as-U-Throw Program
Broome	X			X	X	X	X	X - Binghamton
Chemung	X	X		X	X			
Chenango	X			X		X - 3		
Delaware	X	X - 2				X	X	
Schuyler				X				
Steuben	X	X		X			X	
Tioga				X	X (2013)			X
Tompkins			X	X	X	X		X

Issues and Opportunities

The Southern Tier has already made significant progress in implementing successful waste reduction and diversion strategies at the county level in conjunction with implementing statewide policies. These programs provide an existing foundation of waste reduction practices to build upon and to expand on as well as serve as working proof of regional willingness to implement and practice waste reduction.

Issues

One of the main challenges to increasing recycling rates in the Southern Tier is the rural nature of the Region – sparsely populated with several smaller population centers but no central hub. This population distribution pattern results in high collection and diversion costs for municipal solid waste as well as challenges for providing educational information related to waste program changes or improvements. Curbside recycling is costly for most municipalities in the Region, but might dramatically increase participation and recycling rates.¹⁴⁰ Although it costs money to expand recycling collection points, especially in a rural region such as the Southern Tier, entities that are doing so are finding that it is possible to recoup many of those expenses through targeted sale of recycled materials.

The last decade has seen a vast increase in electronics and appliances with valuable or hazardous components in the waste stream and this trend is expected to continue. Due to planned obsolescence in product design, it is expected this issue will need to be addressed more expansively at all levels, including regionally.

Waste is collected in the Region by a combination of private haulers, self-haul, and municipal collection; many commercial waste generators and haulers are hesitant to share information on costs or recovery volumes, due to the burden of tracking and reporting this information, or regard it as confidential business information. Consequently, the data needed to help drive program innovation is difficult to obtain. Chemung, Broome, and Tioga Counties have all noted difficulties in acquiring waste management information from commercial waste generators, such as grocery stores and other retailers, due to proprietary information concerns. Collaboration with significant waste generators is necessary to plan and implement the action strategies.

Opportunities to expand landfill gas-to-energy recovery in the Southern Tier are limited because landfills not already outfitted with these systems tend to be smaller in size and are generally not good candidates for capture systems given their relatively low methane generation. Many of the most-promising opportunities for landfill energy recovery have been exploited already, and further consolidation of the volume of waste landfilled may be necessary to pursue additional landfill gas capture opportunities. In Chemung County, for example, it was necessary to increase the amount of waste landfilled to make gas-to-energy financially viable.

¹³⁹ Indicates evidence of a system for municipal collection of recyclables in at least one municipality within the county.

¹⁴⁰ For estimates of participation and recycling rates in different recycling systems, see: FAL. (1994). *The Role of Recycling in Integrated Solid Waste Management to the Year 2000*. Keep American Beautiful Inc., and Ohio EPA. (2004). *Drop-off Recycling in Ohio: Measuring and Understanding Participation & Program Effectiveness*. Ohio Environmental Protection Agency (Ohio EPA). Retrieved from www.epa.gov/reg5rcra/wptdiv/solidwaste/ohdropoffrecycling.pdf, July 6th, 2010.

One current challenge with the potential to become a much bigger issue in the future, is determining whether to accept and then how to handle, the landfilling of drill-cuttings from shale gas exploration in nearby states and possibly in New York in the future. Concerns have been raised about the composition of these cuttings and the potential impact on local landfills and surrounding communities.

Opportunities

The Governor, state agencies, and the regional entities have shown significant leadership in the realm of waste management. The NYSDEC has a broad goal of reducing New York State’s daily per capita MSW disposal rate from 4.1 pounds to 0.6 pounds by 2030.¹⁴¹ In order to meet such an aggressive goal, it is anticipated the State will continue to lead the way with a combination of guidance, regulations, and funding opportunities to assist municipalities in meeting the State’s goals. Achieving the goal of 0.6 lbs/day of municipal solid waste disposal is possible by re-directing household and commercial waste to alternative uses.

TABLE 25 ■ Alternatives to Landfilling for Household Waste

Household Waste Type	Current Destination	Proposed Destination
Recyclables	Landfill	Recycling facility
Food scraps	Landfill	Municipal/home compost
C&D	Landfill	Reuse/landfill
ECT	Landfill	Recycling facility

Waste to energy systems have improved significantly in the last 25 years.¹⁴² Such systems are currently being used to reduce landfill waste, reduce GHG emissions, and generate domestic power throughout Europe.

Communities throughout the Southern Tier are already implementing successful programs to manage solid waste. Replication of successful programs in both rural and urban areas of the Region – i.e., sharing program design templates and lessons learned with operators and project partners – is believed to be the most likely strategy to yield successful results in the near term. Programs selected for replication were deemed to have significant ability to reduce GHG emissions, interest by agency partners and/or private businesses, and the potential to positively impact some other aspect of sustainability, such as job creation or environmental protection.

Priority Actions identified for waste reduction were derived from successful programs including the following:

- **Pay as You Throw** or **Save Money and Reduce Trash** programs/policies: as implemented in Tioga and Tompkins Counties and the Cities of Binghamton and Corning.
- **Commercial and municipal composting:**
 - **Cayuga Compost** is a business that collaborates with Tompkins County Division of Solid Waste to compost about 3,400 tons of community-generated waste annually.
 - **Broome County** has invested in a centralized composting facility. The **City of Elmira** maintains a compost facility open from dawn to dusk, seven days a week. Brush, yard waste, limbs, etc., can be dropped at the site free of charge. The material is composted and made available free of charge to residents.¹⁴³
 - **Chemung County** surveyed local government, landscape contractors, and disposal companies and, based on positive feedback, is exploring possibilities for diversion of yard waste.¹⁴⁴
 - **Delaware County** operates a centralized mixed-waste composting system.

¹⁴¹ This refers to the fraction of waste generated that is sent to landfills. In contrast, the daily average rate of waste generation in New York State is 5.15 pounds per capita, according to the New York Department of Environmental Conservation “Beyond Waste: Full Report”, 2010.

¹⁴² <http://www.nytimes.com/2010/04/13/science/earth/13trash.html?pagewanted=all>

¹⁴³ Source -- <http://www.cityofelmira.net/public-works/sanitation>

¹⁴⁴ For more information, see <http://www.dec.ny.gov/chemical/61918.html>.

- **Innovative Reuse Programs:**
 - **The Corning Habitat for Humanity Re-Store** accepts donations of new and gently used home improvement goods, furniture, home accessories, building materials and appliances, and sells those items to the public at a fraction of the retail price to fund their activities. **Finger Lakes ReUse**, a similar program, is described in more detail in the case study below.

A Southern Tier Example

Finger Lakes ReUse¹⁴⁵

Finger Lakes ReUse is a community-oriented retail warehouse in Ithaca, NY stocked with used office equipment, construction material, housewares, home electronics, sporting equipment, and textiles. The center promotes the reuse of materials, provides employment opportunities, and teaches repair and reuse skills to community members. This storefront reuse model embodies “close the loop” thinking for a variety of items, offers the community direct access to re-purchase these items, and markets the commodities while raising awareness about extending the life-cycle of purchased goods.

The Tompkins County Solid Waste Management Division views reuse as an effective, economic, and environmentally friendly measure to reduce waste. Since the County’s commitment to incorporate reuse was introduced as a significant component of their 20-Year Solid Waste Management Plan in 1995, nearly 58 percent of waste has been reduced in the County. Finger Lakes ReUse contributes to this overall waste reduction by reusing materials that would otherwise go straight to landfills. Greenhouse gas emissions are reduced both by avoiding energy that would be used in producing new objects, reducing energy used landfilling waste, and in reducing methane emissions from the process of landfilling.

Finger Lakes ReUse provides economic savings and opportunities for the community. Because the items in the warehouse are all recycled, customers can purchase them at affordable rates, or can take them home in exchange for volunteer labor. As a local business, Finger Lakes ReUse also provides job opportunities for residents, and as the business grows, there are more opportunities for full time, on-site employment. Finger Lakes ReUse employs transition-to-work employees, offering a bridge for persons looking for training and employment experience. Finger Lakes ReUse also trains community members in deconstruction skills (taking down buildings piece by piece rather than demolition); these skills are directly transferable to well-paying construction industry jobs. As communities across New York and the U.S. look for new methods of reducing waste, deconstruction is becoming increasingly more common.

This local organization also provides social benefits to the community. Their educational programs offer residents the chance to learn technical and creative reuse solutions. Finger Lakes ReUse also provides free or affordable materials to schools and non-profit organizations, and offers training to underserved populations in Tompkins County. Tompkins County residents are responding well to the ReUse trend. Sales numbers for each category of items sold in the warehouse increased by between 38 percent and 171 percent from 2011 to 2012 and the number of visitors by 50 percent. This model organization for reuse of a wide variety of local products has proved effective and profitable enough to seek out opportunities for replicating the program in other locations and is currently considering opening a location in Broome County.



Two young men learn the skill of deconstruction.
[Fingerlakesreuse.org](http://fingerlakesreuse.org)

¹⁴⁵ <http://fingerlakesreuse.org/>

Strategy for the Future

Goal

16. Promote innovative waste reduction and management strategies that reduce the amount of material disposed of at landfills.

This goal was selected for Waste Management in recognition that the largely rural Southern Tier will need innovative solutions to address the needs of a rural population where curbside pick-up of recycling, for example, is costly.

Indicators and Targets

Tracking per capita waste disposal will directly measure progress towards promoting innovative waste reduction and management strategies. Four priority actions were identified through the planning process to help achieve the targets shown in the accompanying box, based on technical analysis, stakeholder support, feasibility, and greatest GHG reduction potential. All of these actions would directly help to achieve the target of reducing per capita waste disposal. In order to quantify the expected GHG emissions reductions, assumptions were made about the anticipated implementation of each action over the next 20 years. By 2032, the Southern Tier can expect to reduce GHG emissions by 427,000 MTCO₂e by implementing these actions, though these benefits include some upstream lifecycle emissions not included in the region’s baseline. This represents a reduction greater than baseline emissions, total reductions equivalent to 138 percent of 2010 levels in the waste sector, and a 4 percent reduction in the overall GHG emissions for the Region. These reductions due to waste management are .05 percent of the reductions needed to meet the New York State emissions reduction target. It is assumed that all of these priority actions will need to be implemented to achieve these goals and targets over the Plan’s 20-year timeline. Other supporting actions can be found in the Supplemental Actions list in the Appendix.

INDICATORS
Per capita waste disposal rate (lbs. per capita/day)
Baseline (2010) 4 lbs. of solid waste/ capita/day
Targets:
Long Term (20 year): 50% reduction from baseline (i.e., 2 lbs. MSW/capita/day)
Short Term (5 year): 12.5% reduction from baseline (2010) (i.e., 3.5 lbs. MSW/capita/day)
Total Solid waste generated per capita
Baseline (2010) 0.73 tons per capita

Taking Action

The following four actions were determined to be the most important waste-related actions for the Region to focus on. The assumptions used to calculate GHG reduction potential, and the expected GHG reduction for each relevant action, are detailed in the Implementation Strategy in the Appendix. There is also more detail about the actions marked **TOP 22** at the beginning of this Plan.

▶ **TOP 22** 56. Expand Pay-As-You-Throw trash collection

Goal Supported: 16

Description: Pay-as-you-throw (PAYT) programs charge residents for the collection of their household trash, based on the amount they throw away. This provides a strong incentive to reduce waste production, reducing household and business costs, and increasing recycling and reuse of materials. PAYT advances the principal of the Four R’s of Waste: reduce, reuse, recycle, and rebuy, and also encourages composting. Traditional waste collection systems are paid for through fixed fees, regardless of a resident’s level of usage. Pay-as-you-throw and other unit-based pricing systems require residents and businesses to purchase trash tags that cover the per-unit cost of waste in order to dispose of it. In doing so, they ensure that consumers of waste collection services only pay for the collection of the waste they produce. Various studies have presented the immediate and direct benefits associated with this program, including findings that the

recycling rates can increase by nearly 100 percent as a result of implementing a PAYT system.¹⁴⁶ According to the EPA, PAYT can also reduce overall waste disposal by an average of 14 to 27 percent; various other studies have estimated a 30 to 40 percent reduction in the amount of waste deposited in landfills, directly reducing the environmental impacts and methane emissions from waste.¹⁴⁷ Government action is needed in most cases for municipal solid waste to switch to a PAYT system. This requires time and staff to prepare budget projections and operational changes, public notification and discussion, and implementation planning. It can be difficult to convince residents and businesses that are used to a fixed-fee system that PAYT is a beneficial alternative. An educational campaign for elected officials and the public can outline the fiscal and environmental benefits.

Potential Leads: The six counties in the Region that have not adopted PAYT programs and their solid waste divisions are the primary leads to implement this action.

▶ 57. Introduce innovative reuse strategies to reduce the waste stream

Goal Supported: 16

Description: This action promotes finding ways to reuse hard-to-recycle waste streams, such as food waste, construction and demolition materials, and office and industrial waste. It can also have positive social and economic benefits; excess food that is suitable for redistribution to food banks can promote healthy community initiatives and food waste may be repurposed for animal feed. In the Southern Tier, construction and demolition materials are being repurposed by such entities as Finger Lakes ReUse. This business model could be promoted across the Region to develop a “reuse network” of similar facilities.

Potential Leads: Possible leads for this action include businesses, nonprofits, Cornell Cooperative Extension, and municipal solid waste agencies.

▶ 58. Expand and improve access to recycling

Goal Supported: 16

Description: This action aims to expand recycling systems to include additional drop-off sites or through specialized recycling events such as for electronics or hazardous products, offered with operating hours that are convenient for working people. Expanding curbside collection to more municipalities would facilitate easier recycling for residents, especially if applied to multi-family residences. A complementary concept is to place freestanding recycling dumpster stations in community hubs, school parking lots, or other locations that are accessible to residents at all times. Also, establishing new resource recovery parks, similar to the Finger Lakes ReUse Center, would provide a convenient central location for residents to engage in a variety of waste management activities, such as dropping off recyclables and waste electronics while purchasing compost and reused goods. Although it costs money to establish additional recycling collection points, entities that are doing so are finding that it is possible to recoup many of those expenses through targeted sale of recycled materials. Other funding mechanisms, similar to Tompkins County’s annual solid waste fee, may also need to be considered to support expansion of recycling and reuse programs.

Potential Leads: Possible leads for this action include municipal solid waste agencies and regional and county planning agencies.

Composting in the Southern Tier

- Tioga County has successful public yard waste composting events for rural residents.
- Delaware County operates a centralized mixed-waste composting system.
- Cayuga Compost is a commercial business that partners with Tompkins County Division to compost about 3,400 tons of community-generated waste annually.

¹⁴⁶ See, for example, Connecticut Department of Energy and Environmental Protection, “SMART Programs in Connecticut,” <http://www.ct.gov/deep/cwp/view.asp?A=2714&Q=324920>.

¹⁴⁷ See, for example, U.S. EPA, Pay-As-You-Throw: Lessons Learned about Unit Pricing, <http://www.epa.gov/osw/conserve/tools/payt/pdf/payasyou.pdf>.

▶ **59. Expand and improve access to composting services**

Goal Supported: 16

Description: This action calls for increasing composting through municipal curbside pickup for organic waste, especially food waste. In rural areas there is potential for establishing centralized public composting stations in rural areas where curbside pick-up is not economically feasible, such as at community gardens, co-locating with Resource Recovery Parks, or on other publicly owned property, such as school grounds. Public-private partnerships between municipalities responsible for collection and composters may be an effective model for facilitating larger-scale composting. There can be issues with siting food composting facilities in urban areas, but potential opposition can be overcome with effective operating and management plans.

Potential Leads: Possible leads for this action include municipal solid waste agencies and local governments.

GOVERNANCE

Government entities are critical actors in reducing GHG emissions and supporting sustainability. Local governments have the power to regulate land use and building efficiency. At the national, state, regional, and local levels, government policies are critical to making significant progress in achieving sustainability goals. The Federal government sets minimum fuel efficiency standards for the auto industry and regulates emissions from power plants; the State government makes road improvements, funds water and sewer system upgrades, and enforces water quality standards; and local governments adopt comprehensive plans and land use regulations that guide the pattern of development. In addition, governments can be leaders in adopting sustainability practices and programs that individuals, businesses, and other organizations can follow.

This chapter focuses on the unique role municipal policies, plans, codes, and ordinances play in sustainability efforts in support of the other goals of this Plan. Municipalities can take multiple actions, including local land use, zoning, building, design, and energy codes; land acquisition and assembly; infrastructure investment and finance; legislative proposals that influence where growth and development take place; environmental protection; and investment in transportation, infrastructure, and services. They can also come together through formal regional agencies or less formal collaborations to address one or more of these issues. This chapter identifies priority actions to meet the two governance goals:

- 17. Increase collaboration among regional agencies, institutions, and local governments.**
- 18. Increase fiscal efficiency and effectiveness in local government through energy and waste reduction, coordinated investments, and integrated planning.**

Snapshot of the Region

New York State governing municipalities are made up of counties, cities, towns, and villages. There are eight county governments in the Southern Tier, ranging in population from 18,300 to 200,600; six city governments, ranging in population from 7,200 to 47,400; 125 town governments, ranging in population from 300 to 56,300; and 59 village governments, ranging in population from 200 to 15,200.

These 198 governing municipalities range from rural to more urban – making the interests, concerns, capacity, and governing practices very diverse. While the sheer number of municipalities makes taking coordinated action on any issue difficult enough, there are also numerous other local governmental entities at work in the Region: school districts, water districts, sewer districts, business improvement districts, and others. While these do not have the broad range of powers and responsibilities of municipalities, they play an important role in moving forward some of the sustainability recommendations of this Plan.

Existing local government policies, plans, and codes supporting sustainability. Southern Tier municipalities and regional agencies have been working together on integrated plans and policies that support sustainability for some time. There are strong working relationships among government, institutions, nonprofits, and business leaders, as well as many good examples of projects embodying the principles in this Plan.

Many Southern Tier municipalities' existing plans, policies, and codes reflect a move toward more sustainable practices across all topic areas. The City of Binghamton's Mayor and City Council convened the Commission on Sustainable Development and Smart Growth in 2008 to research best practices and recommend actions for the City to become more sustainable and to pursue smart growth. Recommendations included integrating a SmartCode into City planning, policies and codes; reviewing and reforming the City's municipal code to improve stormwater management; and promoting green building practices.

In 2008, the Tompkins County Legislature adopted a goal of reducing GHG emissions in the community by at least 80 percent from 2008 levels by 2050 and, in September 2010, endorsed a strategy outlining measures to achieve the first step. In the Tompkins County Comprehensive Plan, proposals such as the adoption and

expansion of local tax incentives for energy efficiency and renewable energy system investments and development of model building energy codes make it clear the county is moving toward sustainable practices.

In Schuyler County, four towns, two villages, and the County are in the process of writing or updating their comprehensive plans. The County has tasked the Planning and Community Development Program through Cornell Cooperative Extension of Schuyler County to update and re-envision the Schuyler County Comprehensive Plan into a County-Wide Comprehensive Plan which all of the various municipalities could utilize.

Preserving rural character and protecting farmland and forests.

In the Town of Lindley and Town of Hornby, in Steuben County, residents want to preserve the rural character of their communities. Several policies support this goal: developing incentive zoning to encourage housing on abandoned agricultural land instead of active farmland; applying “buildable” land standards to preserve steep slopes where the majority of unbroken forestlands are located; and adopting a local law requiring registration of timber harvesting operations so that the Towns can provide information about good timber harvesting practices. All eight counties have established Agricultural Districts to protect farmland through landowner incentives and protections designed to forestall the conversion of farmland to non-agricultural uses.

“Let’s do a good job of being small and rural, not a poor job of being big!”

Schuyler County Comprehensive Plan, 2004.

Comprehensive plans, policy, and code changes supporting livable communities. STC’s Comprehensive Economic Development Strategy lists an objective to “assist communities to cultivate a distinct ‘sense of place’” and promote a walkable, livable environment for both residents and visitors by changing local laws to increase density allowances and create sidewalks. The Village of Painted Post is looking to revise zoning laws to promote affordable housing development and mixed-use development in the community, particularly at abandoned sites, like the former foundry site. In Tompkins County, the Village of Trumansburg has revised its zoning ordinance to promote affordable housing through an inclusionary zoning provision coupled with incentive zoning based on a Model Incentive Zoning Ordinance and a Model Inclusionary Zoning Ordinance drafted by the Tompkins County Planning Department.

Issues and Opportunities

Issues

The number of municipalities within the Region makes ongoing coordination and implementation a challenging task. In accordance with state law, most land use decision-making authority is in the hands of each local government. Therefore, it is difficult to develop coordinated strategies at the regional level. Many municipalities have not adopted land use regulations or lack the resources and political will to enforce them. Also, given the exceedingly limited resources of many of the municipalities, finding funding in local budgets to implement this Plan or even staff time to follow through on the least expensive recommendations will be a challenge for many villages and towns. There are several municipalities whose staff consists of a part-time clerk and, maybe, a part-time building inspector who are already stretched to meet all the demands placed on their time.

One of the challenges in the Southern Tier is to adjust and customize plans, policies, and project ideas for the different communities. It may be difficult to apply some of the integrated sustainability concepts across the entire Region. For example, a recommendation to pursue an energy system, such as district heating, would work well in an urban center but not in a small village or rural town. Nor may an action that would improve the economic development in a hamlet be suitable in downtown Binghamton. Each municipality’s physical form, density of population, and resources are different and community interests vary. Bringing the public into the conversation about these potential conflicts as part of comprehensive plan updates can help ensure the community, as a whole, is moving toward a more sustainable future. While local governments have limited funding and staff time to do this work, that can be addressed by pooling funds for pilot projects to create templates, and collaborating to apply for competitive grants.

Opportunities

The Southern Tier Regional Consortium consists of representatives from all counties, cities, and Climate Smart Communities; REDC members; and other stakeholders, such as cooperative extension staff, local economic development agencies, MPOs, colleges and universities, and agricultural agencies. The Consortium is actually an issue and opportunity at the same time. Formed to support and help guide the Cleaner Greener Southern Tier planning process, it is an informal group that does not have any official status, staff, or funding beyond this planning process. Since the Southern Tier Region spans multiple regional agencies, no single agency would be the logical host or sponsor moving forward. However, the Consortium's informal, collaborative structure may also be its strength as Consortium members start to think about actions they might want to take a lead role on or participate in as a pilot project. It will be difficult to continue this collaboration across the region due to the multiple regional agencies and geographies, but Consortium members can build on a variety of existing efforts, most notably the REDC.

The two regional planning agencies already provide services to the array of local governments within their regions. Both STE and STC have a track record of working closely and successfully with their members. They have the opportunity to provide similar services in the pursuit of implementing this Plan, although they would likely need additional resources to do so.

Many of the county and regional plans already address some of the same concerns raised here. Regional and county plans addressing transportation, economic development, sustainable development, trails, water quality, and others support the ideas in this Plan. Many of these other plans have organizations pursuing the same goals.

This Plan builds on the existing plans, policies, and codes adopted by individual towns, villages, and cities. More than 150 plans developed at the regional, county, and local level served as the first level of analysis to this Plan, providing insight into goals and priorities across the Southern Tier, as well as potential concerns and highlights. The best examples among these can be used as a starting point for other municipalities. By sharing their experiences, local governments can learn from others' successes and failures to identify actions they can take to promote sustainable communities. Existing forums for sharing information, such as STC's annual local government conference and STE's training for local officials, can be capitalized on to share this information. Moreover, the Consortium members have agreed to continue to meet periodically to share information and assess progress in implementing the Plan. Connections made among individuals during the development of this Plan offer the potential for creating ad hoc working groups to address certain actions.

The Appalachian Regional Commission (ARC) is a Federal-State-local partnership that works for sustainable community and economic development in Appalachia. All eight counties in the Southern Tier are included within the ARC's region. Each year, the ARC provides funding for dozens of projects within their region, and its many program areas overlap this Plan's topic areas, including community infrastructure, energy, entrepreneurship and business development, and tourism.

A Southern Tier Example

Binghamton Energy and Climate Action Plan – City of Binghamton¹⁴⁸

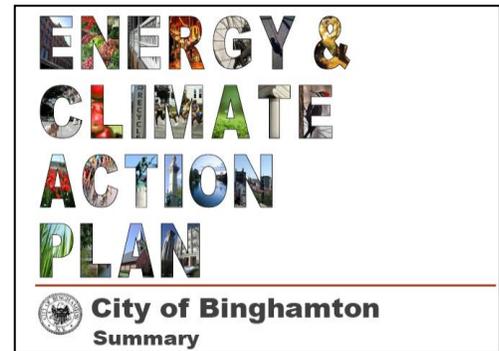
In 2009, the City of Binghamton initiated a five-part process for reducing the City's GHG emissions, following the ICLEI protocols to conduct a baseline emissions inventory and forecast; adopt an emissions reduction target; develop a Local Action Plan; implement policies and measures; and monitor and verify results.

After completing a GHG emissions inventory in 2010, Binghamton City staff and a citizen Climate Action Plan Advisory Committee developed the Binghamton Energy and Climate Action Plan in 2011. The Plan establishes a GHG reduction target of 25 percent from 2006 levels by the year 2025. It also identifies strategies for reducing energy costs, promoting energy independence, and reducing GHG emissions and outlines key objectives in seven

¹⁴⁸ <http://cityofbinghamton.com/departments.asp?zone=dept-planning&pid=147&pm=page>

goal areas: Buildings and Energy; Transportation and Land Use; Waste Management, Reduction, and Recycling; Local Food, Agriculture, and Urban Forestry; Outreach & Education; Government Action; and Adaptation.

Each objective outlines a series of action steps to accomplish the overarching goals. The 2025 objectives and their accompanying action items for each goal area also have co-benefits that positively affect the other key goals. For example, under the Buildings and Energy Goal, one action item is to “Develop ‘Greener is Greater Binghamton Challenges’ for homes and businesses.” While this activity is directly related to building GHG emissions reductions, it will also reduce household and business energy costs, and strengthen the local economy by investing local dollars in activities that create local jobs instead of making energy payments that leave the area.



While some other municipal Climate Action Plans set goals, define objectives, and outline action items mainly for public operations, Binghamton sets goals for both public operations and the community at large. The entire plan includes 17 objectives with approximately 50 action items identified to achieve these objectives. Several categories promote community actions, such as promote and facilitate commuting by walking, biking, carpooling, and public transit instead of private cars; the government action items include specific operational tasks like replacing all streetlights with energy efficient bulbs and fixtures by 2020. The Binghamton City Council adopted a resolution in support of the plan and its accompanying goal areas, objectives, and action items in 2011. The first action to begin implementing the plan is creating an Energy and Climate Action Task Force to ensure and facilitate the long term implementation and evaluation of the plan.

Strategy for the Future

Goals

17. Increase collaboration among regional agencies, institutions, and local governments.
18. Increase fiscal efficiency and effectiveness in local government through energy and waste reduction, coordinated investments, and integrated planning.

These two goals were selected for Governance in recognition that this is a new Region with little history of working together and that implementing this Plan will require actively forging those relationships, while at the same time providing leadership within the Region by reducing resource use in public facilities.

Indicators and Targets

Climate Smart Communities pledge to reduce GHG emissions and commit to climate change adaptation. By following through on this commitment, communities will work to reduce energy and waste in order to increase fiscal efficiency and effectiveness. Six priority actions were identified through the Cleaner Greener Southern Tier planning process to help achieve the targets shown in the accompanying box as well as targets identified throughout this document. Having in place mechanisms to coordinate activities regionally, to share success stories, and to learn from each other’s mistakes will form the basis for meeting the ambitious targets that have been identified. One such mechanism that can be tracked is NYS’s Climate Smart Communities program. As more communities join the program and see the benefits that result, their awareness of sustainability issues will grow and it is anticipated that they will choose to join as partners in the program. The GHG benefits of the

INDICATORS

Number of Climate Smart Communities within region and number of certified Climate Smart Communities.

Baseline (2010)

5 Climate Smart Communities

Targets

- Long Term (20 year): 100 percent of counties and 50 percent of municipalities
- Short Term (5 year): 25 percent of counties and 12.5 percent of municipalities

actions below cannot be quantified. Collectively, they help support the majority of the actions in the other eight topic areas, and would help lead to significant GHG emission reductions that are measured under other actions and targets. It is assumed that all of these priority actions will need to be implemented to achieve the goals and targets across all topic areas over the Plan's 20-year timeline. Other supporting actions can be found in the Supplemental Actions list in the Appendix.

Taking Action

The following six actions were determined to be the most important governance-related actions for the Region to focus on.

▶ 60. Strengthen the Southern Tier Regional Consortium

Goal Supported: 17

Description: The Southern Tier Regional Consortium (Consortium) consists of representatives from all counties, cities, and Climate Smart Communities in the Southern Tier; Southern Tier Regional Economic Development Council (REDC) members; and other regional stakeholders, such as cooperative extension staff, local economic development agencies, MPOs, colleges and universities, and agricultural agencies. The Consortium was established to involve municipal planning representatives and a cross section of Southern Tier leaders and topic area experts in this planning process. Consortium members have reviewed, discussed, and helped to refine draft elements of the Cleaner Greener Southern Tier Plan. The Consortium, the Regional Economic Development Council, and the Southern Tier Central and Southern Tier East Regional Planning and Development Boards will be the primary regional entities working to coordinate implementation of this plan.

This action will be difficult to continue across the region due to the multiple regional agencies and geographies, but Consortium members can build on a variety of existing efforts. STC and STE already have strong working relationships with each other and with their member localities, and can take a lead or supporting role on many of the projects identified in this plan (although many actions will require additional funding or staff). Members can continue supporting and strengthening the Consortium by encouraging other municipal leaders, organizations, University sustainability leaders, municipal service providers, and others to join the Consortium.

Potential Leads: The Consortium will be important in ensuring that the goals of this Plan continue to be considered and met as municipalities move forward with planning and implementing sustainability initiatives. The Consortium could also provide opportunities for its members to collaborate in smaller topic-area ad hoc work groups (or Communities of Practice) to share knowledge and strategies across the Region.

▶ 61. Develop regional coordinated planning and policy guidance documents

Goals Supported: 17 and 18

Description: Based on further review of existing planning documents and codes, a set of templates can be developed that could be re-used and customized for all municipalities across the Region. These documents would be developed in partnership with local governments working collaboratively, serving as pilot projects that represent a range of community types, sizes, geographic differences, and specific planning and development issues. A toolkit of regional guidance documents could make it easier for local governments to coordinate and collaborate on plans and project-level implementation. While local governments have limited funding and staff time to do this work, that can be addressed by pooling funds for pilot projects to create templates, and collaborating to apply for competitive grants. It is linked to several other actions in other topic areas that describe specific plans, codes, policies, and other documents or projects that might benefit from coordinated development. Topics to be addressed initially would reflect the Region's 65 priority implementation actions and would likely evolve over time. Since climate change and disaster planning are not yet fully understood by residents and elected officials, a draft chapter that outlines the issues and suggested actions could be prepared for use in comprehensive plan updates, and adapted as needed for different municipalities. The EPA has developed guides for reviewing and updating both urban

and rural planning and development policies and codes.¹⁴⁹ The Town of Ithaca recently created a Conservation Zone along the west shore of Cayuga Lake to ensure the protection of wooded and steep slopes. Using these and other local code examples as models, interested municipalities can explore similar applications in other areas throughout the Southern Tier.

Potential Leads: Possible leads for this action include the regional planning and development boards.

▶ 62. Hold regular conferences and training for planning boards, agency staff, and community stakeholders

Goals Supported: 17 and 18

Description: Implementing the Cleaner Greener Southern Tier goals should include ongoing public outreach and project-level work with communities. Municipal staff and elected officials will want to learn more about what the Plan means to their community, and how they can access tools and planning resources to develop their own project implementation strategies. The short time frame of this Initiative does not allow the partners to fully develop the training, understanding, and buy-in needed for the Region to take action on the recommendations.

The Southern Tier Central RPDB holds an annual municipal training institute for planning and elected officials, including continuing education credit.

The Southern Tier East RPDB conducts municipal training for compact development across the STE region.

Ongoing interaction among regional and local elected officials, planning boards and staff, operating agencies, and community volunteers and activists can help the local governments and Consortium members to implement the Plan and track its progress. It will also help regional agencies and local planning boards to coordinate planning efforts. Given the amount of expertise available in the region across the topic areas, it should be feasible to develop and conduct effective training. A series of presentations at local community colleges or hosted by regional agencies could provide training on sustainability principles, transportation strategies, policies, and code changes that could be considered for implementing the Cleaner Greener actions in each municipality. Training sessions can also be incorporated into ongoing planning processes and project development. Staff could work with the towns, villages, and counties; the regional planning boards could develop sample language and draft chapters on the many topics covered by the plan, all to be made part of the communities' comprehensive plans. Southern Tier East's partnership with the Tioga REAP Stronger Economies Together Program, which focuses on rural economic and civic development, could be used as a model for similar efforts in other counties.¹⁵⁰

Potential Leads: Possible leads for this action include the regional planning and development boards.

▶ 63. Coordinate regional ad hoc working groups focused on key implementation actions

Goal Supported: 17

Description: Many of the agencies, organizations, and staff likely to be involved in implementing this plan already meet regularly on a variety of issues. These include transportation planners, local planners, economic development groups, environmental organizations, and others, though most do not meet with all of the regional players involved on any one issue. In some cases, progress can be made by simply adding plan implementation as an agenda item in these regular meetings. In some topic areas, there may not be an existing agency or organization that covers the Region and gathers all parties interested in a particular topic or action, such as water and wastewater system operators. To leverage staff expertise and available time, an ad hoc working group could be formed to pilot test specific sustainability solutions. Consortium members could help coordinate across agencies to make sure that information learned from each pilot project is shared across the Region. Sometimes called 'communities of practice,' ad hoc working groups are informal, and only last as long as needed to accomplish specific goals. Each ad hoc working group can focus on specific

¹⁴⁹ "Essential Smart Growth Fixes for Rural Planning, Zoning, and Development Codes", 2011, U.S. EPA. "Essential Smart Growth Fixes for Urban and Suburban Zoning Codes". 2010, U.S. EPA. http://www.epa.gov/smartgrowth/essential_fixes.htm

¹⁵⁰ <http://www.tiogareap.org/>

actions, determining what project types and locations would be most effective as demonstrations, and which communities are interested in sponsoring. The Consortium can explore how best to gather and share results from each project.

For example, while the Region's three major airports are in competition with each other for travelers, they are also competing nationally with other regions. In addition to operational coordination to test sustainability strategies like Binghamton's heated runways project, a coordinated green marketing strategy could be linked to regional sustainable tourism marketing initiatives, and to coordinated ground transport, so that tourists could seamlessly fly into one of the Region's airports and out of another. Increased collaboration among area educational institutions could help the Region capture and build upon sustainability initiatives and advanced technology being developed at local universities and colleges. While institutions may compete for students and faculty, they are also likely to specialize in different fields and research topics that might complement each other. At the academic level, educational institutions could collaborate to align their research efforts and training programs to address any of the sustainability initiatives in this plan. At the administrative level, sustainable purchasing, facilities management, transportation, and management strategies can be shared and replicated across campuses. The same approach could be used for public and private K through 12 school districts.

Potential Leads: Possible leads include regional planning agencies, transportation planners, local planners, economic development groups, environmental organizations, higher education and school districts.

▶ 64. Identify and share examples of existing efficient practices

Goals Supported: 17 and 18

Description: The Consortium, regional planning boards, and the REDC can establish an ad hoc fiscal efficiency working group to research and evaluate the most cost-effective sustainability actions to be undertaken in this Region, building on the Cleaner Greener Southern Tier Plan priority actions. The ad hoc working group would be composed of Consortium member administrators, budget analysts, purchasing agents, and sustainability planning staff. It would also be helpful to partner with area universities to help track and evaluate ongoing projects through case studies in student research and class projects. To be effective over time, this effort will likely require dedicated staff to analyze and report on best practices and lessons learned.

Potential Leads: Possible leads for this action include regional and county planning agencies and councils of government.

▶ 65. Encourage participation and certification in the Climate Smart Communities program

Goals Supported: 17 and 18

Description: The Climate Smart Communities program is a partnership between New York State and local communities to reduce GHG emissions and save taxpayer dollars through climate smart actions that also promote community goals of health and safety, affordability, economic vitality and quality of life. It is administered by a partnership of five state agencies, including NYSERDA. Currently there are five Climate Smart Communities in the Southern Tier, including cities, towns, and counties. Any town, city, village or county can join Climate Smart Communities by adopting the CSC Pledge; becoming certified requires developing a climate action plan and taking steps to implement it. This action has been selected as an indicator for tracking progress on this regional sustainability plan. Although there may be limited interest in becoming certified initially, as the Plan's implementation continues and more communities are sharing success stories, cost savings, and meeting other goals, more communities are likely to join.

Potential Leads: Possible leads for this action include regional and county planning agencies and councils of government.

Next Steps

The Southern Tier Regional Consortium should continue in its role as a coordinating body that meets at regular intervals to provide updates and evaluate the progress of this Plan.

Ad hoc working groups should be established to develop and implement the Top 22 Actions and encourage likely local and regional entities to pursue these sustainability priorities. Ad hoc working group members could make the necessary connections with private and public leaders on particular sustainability initiatives. A prime example of such an ad hoc working group is one initiated with the Region's MPOS, transit entities, NYSDOT regions, and transportation program managers working to pursue the transportation recommendations. This group, convened to provide professional expertise in developing this Plan's priority transportation actions, is well-placed to act as project lead or partner to make progress toward sustainability goals.

In addition, there is a very important role for municipal governments to play in this Plan. All local governments will receive a copy of the Executive Summary, Top 22 Actions, and Implementation Strategy as well as the Guide for Action. These products resulting from the Cleaner Greener Southern Tier planning process, along with web-based full plan documents, will serve as a resource to communities across the Southern Tier considering taking action on sustainability, as well as a host of other planning issues.