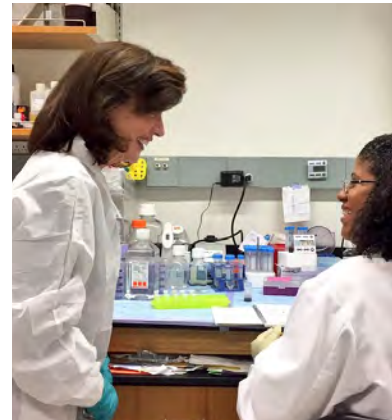
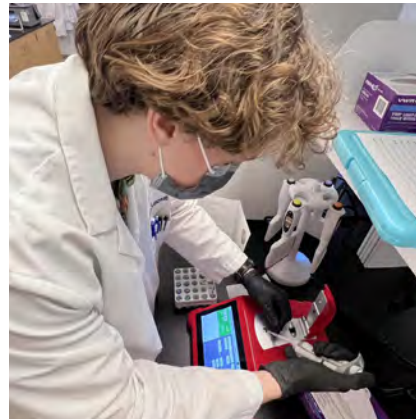
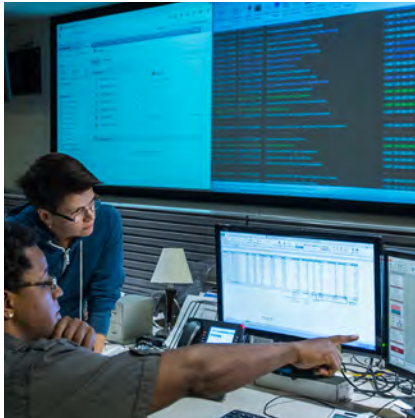


Workforce Development Strategy



**Regional Economic
Development Councils**

A Division of Empire State Development

December 2022

The New York City Regional Economic Development Council with support from Empire State Development and the Office of Strategic Workforce Development guided the development of regional workforce development strategies recommended herein. A consultant team consisting of BJH Advisors and Workforce Opportunity Services prepared this document.

About the Office of Strategic Workforce Development (OSWD)

On April 26, 2022, Governor Kathy Hochul announced the creation of the Office of Strategic Workforce Development (OSWD), a new division within Empire State Development (ESD) charged with better aligning workforce development efforts with the needs and priorities of today's employers.

Empire State Development will utilize its existing relationships with employers to drive Governor Hochul's vision of creating industry-oriented training that provides in-demand skills and direct job placement. Investments will be focused on targeted economic sectors that are ripe for growth. Through OSWD, ESD will help create new economic opportunities for unemployed, underemployed and underrepresented workers, while simultaneously meeting the labor needs of the state's highest-growth industry sectors.

Working closely with the New York State's ten Regional Economic Development Councils (REDCs), OSWD will engage local stakeholders to identify and prioritize in-demand skills and industries in each region's highest-growth sectors. This partnership will help ensure each region's workforce training programs are addressing current and evolving employer needs and allow local training providers to better align their programs to these priorities.

About the New York City Regional Economic Development Council

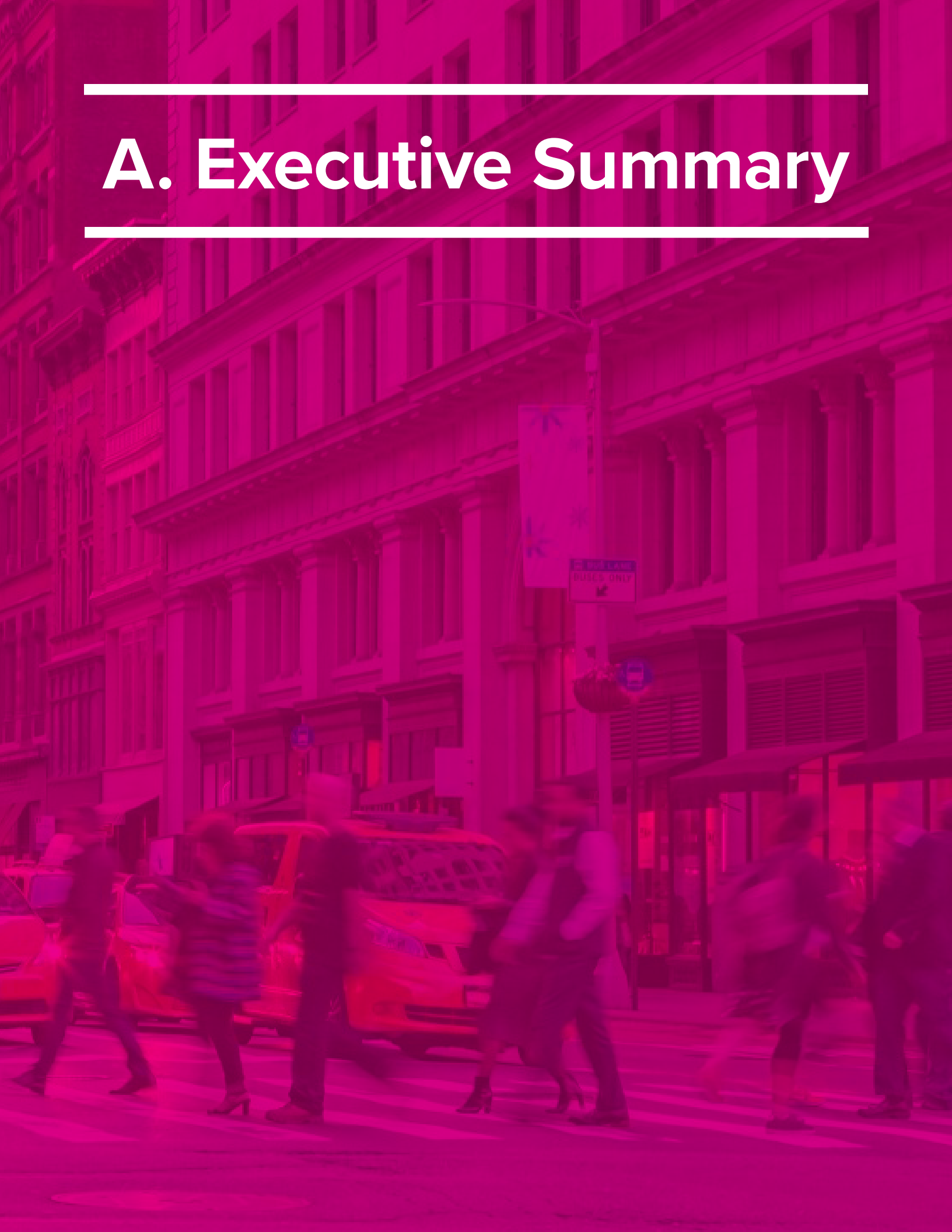
The Regional Economic Development Councils (REDCs) support the State's innovative approach to economic development, which empowers regional stakeholders to establish pathways to prosperity, mapped out in regional strategic plans. Through the REDCs, community, business, academic leaders, and members of the public in each region apply their unique knowledge and understanding of local priorities and assets to help direct State investment in support of job creation and economic growth. Recognizing the importance of the academic community to economic prosperity, the REDCs facilitate collaboration between business and educational and research institutions to ensure that employer workforce needs are met and that business support services are available to start-up companies seeking to commercialize academic research.

The New York City REDC (NYC REDC) is the economic development advisory body for the five boroughs of New York City. The NYC REDC develops an annual strategic plan for inclusive economic growth and establishes project priorities to help New York State make investments and policy decisions that effectively address these challenges. The NYC REDC aims to ensure that New York City continues to grow and prosper and that economic opportunities are widely shared across its neighborhoods and diverse populations, especially where need is greatest.

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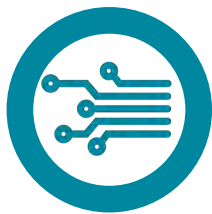
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A. Executive Summary



A. Executive Summary

This Workforce Development Strategy creates a roadmap for addressing workforce challenges in select high-growth tradable sectors within New York City (the Region). The strategies are meant to build upon the 2022 New York City Regional Economic Development Council's (NYC REDC) Annual Report and Regional Workforce Inventory. In the Regional Workforce Inventory, the NYC REDC provided ideas for how New York City's workforce system might meet the needs of the community by responding to COVID-19, developing career pathways to the middle class, and providing access and inclusion for underrepresented communities. In addition, the Regional Workforce Inventory prioritized three tradable industry sectors for their potential to grow and to sustain healthy labor markets. These sectors are:



TECHNOLOGY



LIFE SCIENCES



OFFSHORE WIND

As a second phase of regional workforce development planning, Empire State Development (ESD), engaged a consultant team consisting of BJH Advisors (BJH) and Workforce Opportunity Services (WOS). The consultant team analyzed regional labor market information and workforce demographic data, presented in **Section B** of this report. The full occupational and labor data assessments are provided in Appendix A.

Section C of this report provides a summary of stakeholder outreach and interview findings with government agencies, non-profit organizations, and private sector actors. In total, the consultant team conducted over 20 stakeholder interviews. Themes that emerged from stakeholder interviews include:

- Lack of awareness in the labor force about occupations, trainings, and careers paths
- Challenges with integrating younger workers and recent graduates into the workforce
- Challenges in hiring non-Bachelor's degree candidates and underrepresented workers
- Difficulty in coordinating and accessing wraparound services

Sections D through G provide the recommended strategies developed for each targeted tradable sector. The strategies address sector occupational needs, identify training components, and highlight potential and existing programming for expansion. The strategies are listed in Table 1 on the following page.

Based on these strategies, NYC REDC is looking forward to collaborations and alignment with other entities including City University of New York (CUNY), State University of New York (SUNY), New York City Economic Development Corporation (NYCEDC), and the NYC Mayor's Office of Talent and Workforce Development. By collectively implementing these workforce development strategies, organizations will be well-poised to capitalize upon competitive regional strengths and reduce barriers to employment for all New Yorkers.

TABLE 1. NYC REDC WORKFORCE DEVELOPMENT STRATEGIES



Technology

- 1** Foster the K-12 Technology talent pipeline
- 2** Engage industry partners to align training and hiring needs for college and college-alternative students
- 3** Bridge training gaps for transitioning workers and underserved communities



Life Sciences

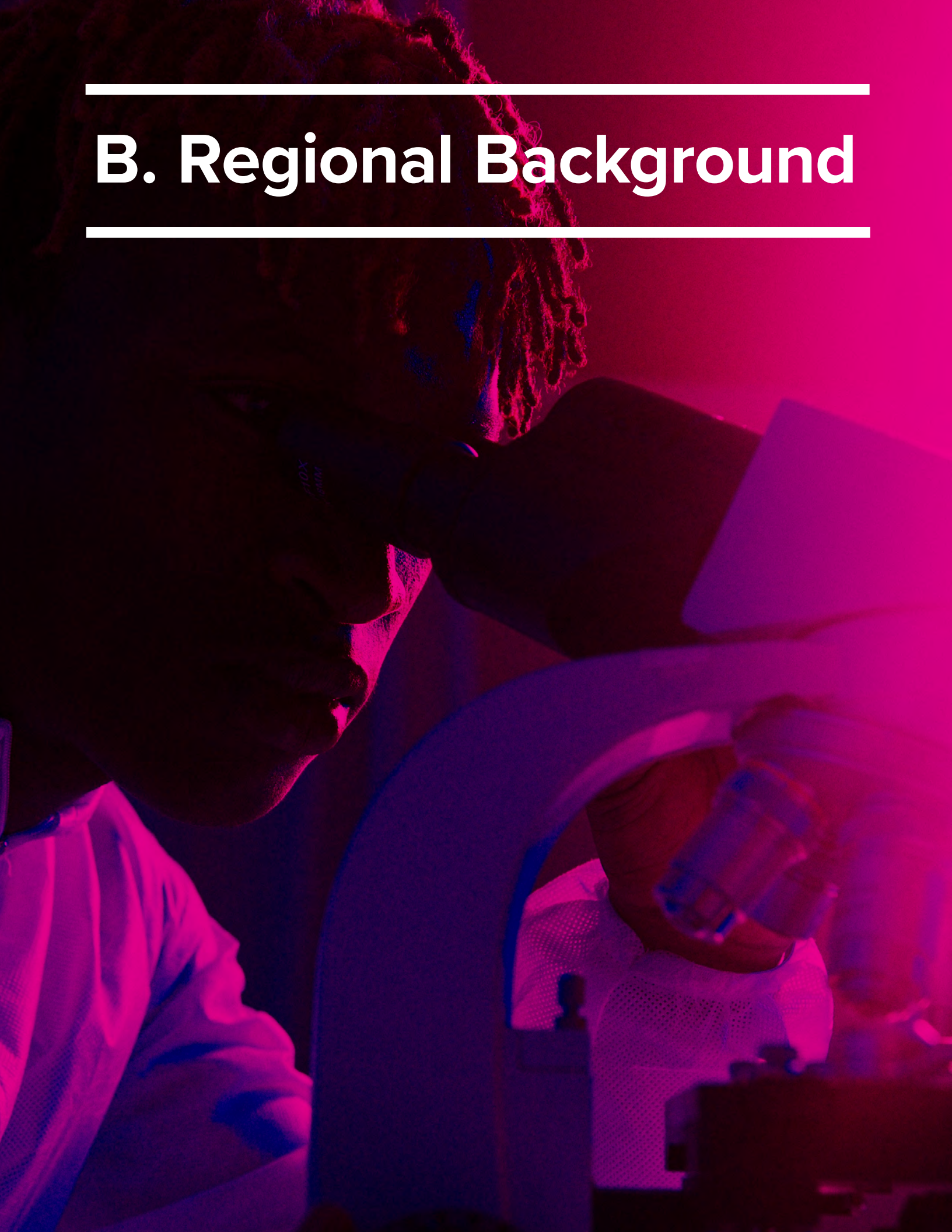
- 1** Promote hands-on learning opportunities for students of all ages
- 2** Support training for in-demand entry-level positions
- 3** Evaluate recruitment and onboarding practices to increase diversity



Offshore Wind

- 1** Generate awareness for the sector
- 2** Expand multi-disciplinary training capacity through coursework and apprenticeship
- 3** Enhance recruitment and upskilling of workers in adjacent fields to meet hiring demand

B. Regional Background



B1. Regional Background

New York City is a growing and constantly evolving global city-region, with diverse demographics and world-leading industry sectors. With 8.8 million residents, New York City is the largest urban area in the State and has a gross domestic product of \$1.0 trillion. As the financial capital of the world, it is a leader in industries including Technology, Financial Services, Life Sciences, and Education. Foreign-born workers in New York make up 36 percent of the population, and over 200 languages are spoken across the five boroughs. It is through this labor and economic diversification that New York City continues to foster innovation.

The NYC REDC is the State's economic development advisory body for the five boroughs of New York City. The NYC REDC develops an annual strategic plan for inclusive economic growth and establishes project priorities to help State agencies make investments and policy decisions that effectively address these challenges. The NYC REDC aims to ensure that New York City continues to grow and prosper, and that economic opportunities are widely shared across its neighborhoods and diverse populations, especially where need is greatest.

DEMOGRAPHICS



POPULATION
8.8 million

As of 2020 Census



EDUCATIONAL ATTAINMENT
39%

With College Degree or Higher



MEDIAN AGE
36.9

44% between ages 25-55



HOUSEHOLD INCOME
\$67,049

As of 2020 Census



NON-WHITE
59%

37% for New York State

LABOR & ECONOMY



TOTAL LABOR FORCE
4.0 million

As of December 2022



GROSS DOMESTIC PRODUCT
\$1.0 trillion

As of 2020



AVERAGE EARNINGS
\$113,723

Per Year



UNEMPLOYMENT RATE
5.9%

As of December 2022



COMPETITIVENESS
-69,966

Jobs gained/added due to regional competition

Sources: Lightcast, New York State Department of Labor, U.S. Census, New York Federal Reserve.

B2. Tradable Sectors

Tradable sectors are those industries that produce goods and services that can be sold outside their local region, as opposed to local sectors, such as Health Care and Construction, whose goods are not sold outside their region. Tradable sectors attract a greater share of external investment and are crucial to regional economic expansion.

In 2022, each of the REDCs in New York State undertook a Regional Workforce Inventory that identified those tradable sectors that showed significant promise for economic growth and would benefit strongly from workforce development efforts. The NYC REDC determined its priority tradable sectors and corresponding workforce development needs using three sources of information: (1) a survey of employers and jobseekers conducted by the State of New York in 2022; (2) statistics from

the New York State Department of Labor detailing trends within industry sectors; and (3) qualitative data from interviews with workforce and economic development stakeholders.

As a result of this effort, the following tradable sectors were identified as priorities for workforce development in the city: Technology, Life Sciences, and Offshore Wind. As part of its engagement for the development of this report, the consultant team performed further analysis to evaluate additional factors, including labor metrics, occupational requirements, existing initiatives, and alignment with broader State priorities. Together, the NYC REDC and the consultant team confirmed the above sectors as key areas of need and opportunity.

TECHNOLOGY



 **TOTAL JOBS**
190,916

 **CHANGE 2011-21**
+81%

 **CHANGE 2021-31***
+28%

 **AVG. EARNINGS**
\$216K/yr.

 **NON-WHITE**
43%

 **WOMEN**
40%

LIFE SCIENCES



 **TOTAL JOBS**
18,225

 **CHANGE 2011-21**
+37%

 **CHANGE 2021-31***
+41%

 **AVG. EARNINGS**
\$163K/yr.

 **NON-WHITE**
54%

 **WOMEN**
58%

OFFSHORE WIND



 **TOTAL JOBS**
13,066

 **CHANGE 2011-21**
+10%

 **CHANGE 2021-31***
+10%

 **AVG. EARNINGS**
\$137K/yr.

 **NON-WHITE**
50%

 **WOMEN**
21%

**Projected Change. Sources: Lightcast, 2021.*

C. Outreach



C1. OUTREACH SUMMARY

BJH and WOS conducted stakeholder engagement to inform key research findings. The stakeholder engagement efforts included one-on-one meetings, small focus group meetings, REDC meetings, and a small informational meeting. Input gathered through this process informed and refined final recommendations. The consultant team's outreach efforts are summarized below.

Presentation to NYC REDC

The consultant team made a presentation to the NYC REDC meeting on September 12, 2022 to discuss the study scope.

Stakeholder Interviews

The consultant team conducted over 20 interviews with over 30 individuals throughout the REDC strategy development process including City agencies, community colleges, workforce development organizations, union representatives, and private sector representatives. A list of all of the interviewees is presented on the following page in Table 2.

Informational Session

The consultant team convened a virtual informational meeting with all stakeholders on November 10, 2022 to gather feedback on draft recommendations and share information on the newly formed OSWD - a division of ESD that will **invest in workforce programs throughout the State.**

Working Group Meetings

A working group of NYC REDC representatives guided the formulation and prioritization of sector-specific strategies. The working group held regular meetings for the duration of the study to provide feedback on consultant team efforts, and to discuss insights gained through the study's stakeholder engagement.

“

For New York State to grow and thrive in the 21st century, we need to invest in the programs that provide and create opportunities for more New Yorkers to learn the skills that employers need.

”

Hope Knight,
Empire State Development
President, CEO and
Commissioner

TABLE 2. LIST OF INTERVIEWEES

SECTOR	ORGANIZATION	INTERVIEWEES
General Workforce Development	NYC Mayor's Office of Talent and Workforce Development	Abby Jo Sigal, Executive Director
	NYC Economic Development Corporation - Initiatives - Workforce	Liat Krawczyk, Vice President Melinda Garrett, Assistant Vice President
	NYC Department of Education	Katharine Gallogly, Senior Advisor
Technology	Kingsborough Community College	Edwisimone Rodriguez, Vice President Christine Zagari, Director of Operations Alissa Levine, Director of Programs
	Pursuit	Jukay Hsu, CEO and Founder Steve Critin, Vice President
	Per Scholas	Plinio Ayala, President and CEO Debbie Roman, Managing Director
	Boyce Technologies	Jamie Waxman, Senior HR Manager
	Tech:NYC	Jason Clark, Executive Director Julian Kline, Head of Policy
Life Sciences	BioLabs @ NYU Langone	Glennis Mehra, Director
	Harlem Biospace	Samuel Sia, Co-Founder Christine Kovich, Co-Founder Chrisha Nario, Site Director
	BioBAT	Tom Hill, Executive Director
	Envisagenics	Carlo Yuvienco, Senior Director
	NYC Economic Development Corporation - Initiatives - LifeSci NYC	Susan Rosenthal, Senior Vice President Monica Malawney, Vice President
Offshore Wind	Manufacturing and Industrial Innovation Council	Neil Padukone, Executive Director
	NYC Economic Development Corporation - Initiatives - Smart and Sustainable Cities	Sonia Park, Vice President Nse Esema, Vice President Sam Jung, Assistant Vice President
	LaGuardia Community College	Sunil Gupta, Vice President Hannah Weinstock, Senior Director
	Orsted	Erik Antokal, Director Workforce Development Vennela Yadhati, Senior Manager
	SUNY Maritime	James Rogin, Director Scott Dietrich, Vice President for Finance Mark Woolley, Chief of Staff
	Joint Industry Board of the Electrical Industry	Michael Yee, Director

C2. OVERALL THEMES

The consultant team and the NYC REDC created a transparent engagement process, reaching out to general workforce stakeholders and industry focused specialists to inform the development of strategies. Below is a summary of key themes from the outreach.

Lack of awareness in the labor force about occupations, trainings, and careers paths

- Stakeholders reported that many jobseekers lack awareness about occupations and career paths in the targeted industries. Many jobseekers or recent graduates may have interest in these sectors, but they do not pursue open opportunities due to assumptions about training and job requirements.
- Jobseekers who are looking to retrain or re-skill do not always have a clear understanding of career paths. In sectors such as Life Sciences and Offshore Wind, the jobs or careers may be nascent or evolving, or training for positions in these sectors are in formation.

Challenges with integrating younger workers and recent graduates into the workforce

- Curricula at local institutions may not match up with employer needs. Stakeholders noted a lack of adequate skill sets among younger workers despite an uptick in labor force needs.
- Younger job candidates lack work experience, but there are not enough internships, apprenticeships, and mentorship opportunities for them.
- Several stakeholders cited a lack of soft skills among younger workers. These soft skills include professionalism, communication, time management, organization, and teamwork. Some stakeholders expressed that the COVID-19 pandemic contributed to this lack of soft skills among labor force participants.

Challenges in hiring non-Bachelor's degree candidates and underrepresented workers

- Stakeholders noted “degree-inflation” is a challenge for jobseekers as employers require college degrees for jobs that do not require college-level skills or did not require degrees in the past.
- Although resources and programs exist to support workers from underrepresented communities, stakeholders noted that there are challenges with integration into the workforce. Stakeholders noted there is a misperception among hiring managers and recruiters that CUNY and SUNY schools are not reliable sources of top-tier talent.

Difficulty in coordinating and accessing wraparound services

- Lack of childcare is a significant impediment for parents and other caregivers looking to enter or reenter the workforce. Many stakeholders noted wraparound services addressing child care needs are an essential component for any workforce development strategy.
- The high cost of living in New York City was cited as a frequent concern. Finding affordable housing options is a significant hurdle to recruiting and retaining employees, particularly younger employees. Transportation is another needed wraparound service, particularly for lower skilled workers who do not have cars and cannot access jobs further from transit served areas.

D. Strategies Overview



South Fork Wind

Powered
Ørsted &
Eversource

D1. STRATEGIES OVERVIEW

This report includes strategies for each of the selected priority sectors, detailing action items for investments and programming to strengthen worker skills, increase diversity in the labor force, and create training programs to support industry needs. The consultant team also identified four overarching approaches that may be deployed across all sectors to expand workforce readiness. These overarching strategies are summarized below.

1. Expand and Reinforce Successful Programs and Initiatives

Many of the strategies outlined in this report highlight programs and initiatives that successfully serve industry needs. These include internship and apprenticeship programs under the sponsorship of private sector partners, NYCDOE, SUNY, CUNY, and nonprofit organizations.

2. Coordinate Siloed Workforce Development Efforts

Workforce development efforts in the Region are challenged by the siloed, underfunded, and disconnected nature of many of these programs and the lack of region-wide coordination. Fragmentation makes it difficult for both employers and job-seekers. To respond to this challenge, the City recently established the Future of Workers Task Force which will serve to align the nearly two dozen City agencies and offices that administer workforce training and job placement programs.

3. Promote Targeted Outreach and Reduce Barriers to Entry

Several strategies across the three priority sectors in this report focus on cohorts of jobseekers who have faced significant barriers to entering the workforce or identifying effective paths for career transition: youth, people of color, women, and veterans. A successful workforce development strategy will include access to career counseling, mentorship, and employer-based training programs for these populations.

4. Address the Need for Wraparound Services, particularly Child Care

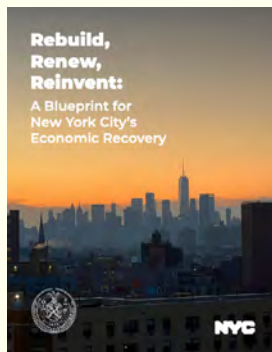
Lack of child care is a significant barrier preventing many parents from entering or reentering the workforce. While larger employers often have the resources to provide child care services, either onsite or through third party contracts, many smaller and mid-size companies do not. The New York State Child Care Assistance Program (CCAP) provides eligible families with funds to pay for some or all childcare costs. A workforce development strategy should also facilitate the wider provision of employer-hosted child care services, identify third-party partners, and promote existing child care subsidies.

Adequate transportation links and affordable housing are also important factors in facilitating access to jobs in the Region. Fair Fares NYC, Commuter Benefits, and other workforce organization subsidies provide transportation cost subsidies for city residents. This program should be evaluated and expanded as necessary. Furthermore the pandemic and its associated relocation patterns brought new higher income populations into many localities in the Region. This has resulted in significant increases in housing costs that have made it difficult for some employees or job-seekers to live near their work. State and local governments should also bolster programs that incentivize workforce housing and affordable housing units.

SPOTLIGHT: WORKFORCE DEVELOPMENT INITIATIVES IN NEW YORK CITY

REBUILD, RENEW, REINVENT: BLUEPRINT FOR NEW YORK CITY'S ECONOMIC RECOVERY

In March 2022, Mayor Eric Adams released **Rebuild, Renew, Reinvent: A Blueprint for New York City's Economic Recovery**, which outlines a plan for the future of the city's economy. The plan specifically aims to accelerate the return to pre-pandemic employment levels, while simultaneously laying the foundation for the city's economic future by addressing historic injustices and modernizing approaches to business development.



The plan to accelerate the city's recovery and build a more resilient economy rests on five key pillars:

- Restarting the city's economic engines and reactivating the public realm;
- Supporting small businesses, entrepreneurship, and a more equitable economy;
- Driving inclusive sector growth and building a future-focused economy;
- Connecting New Yorkers to quality jobs and in-demand skills; and
- Planning and building for inclusive growth now and in the future.

FUTURE OF WORKERS TASK FORCE AND EXECUTIVE ORDER #22

In August 2022, Mayor Adams signed Executive Order #22 convening the Future of Workers Task Force. The Future of Workers Task Force is composed of leaders from New York City's private, nonprofit, and philanthropic sectors, and is charged with rebooting the City's approach to talent and workforce development.

The Task Force is in the process of developing a framework and action plan that will focus on launching youth into economically secure careers by the time they are 25 years old; facilitating employer access to local talent; improving diversity of the city's workforce; disaggregating and analyzing the data of employment and wages; and assessing efficient and effective investment of public resources into economic and workforce development.



NYC Mayor Eric Adams and Executive Order #22

MAYOR'S OFFICE OF TALENT AND WORKFORCE DEVELOPMENT

The Mayor's Office of Talent and Workforce Development is responsible for the city's talent and workforce development system that benefits city residents, employers, and the economy. The Mayor's Office of Talent and Workforce Development will seek out opportunities to streamline and improve coordination among the more than two dozen City and State agencies that manage workforce programs, as well as CUNY, NYCDOE, nonprofits, intermediaries, and employers. The Mayor's Office of Talent and Workforce Development seeks new and effective ways to scale and sustain productive public/private partnerships; to develop and match talent to promising careers; to align its education, career preparation and skills training programs across City government; and to coordinate program and fiscal data across stakeholders to provide a comprehensive view of the talent system with the goal of making progress towards citywide employment objectives laid out in Executive Order #22. Important initiatives include:

- Convening the Future of Workers Taskforce to engage key, non-government stakeholders ;
- Establishing the NYC Interagency Cabinet;
- Launching a Talent Investment Fund to transparently invest in best practices;
- Managing the NYC Workforce Development Board to signal commitment to public/private partnerships;
- Partnering with City agencies to develop programs and strategies to tackle historic employment challenges presented to people with disabilities; and
- Encouraging more equity in hiring.

"NEW" NEW YORK PANEL

The "New" New York Panel was launched in May 2022 by Governor Kathy Hochul and Mayor Eric Adams to examine the future of New York City and the region's economy. Composed of a broad and diverse cross section of civic leaders and industry experts, the panel is charged with creating a shared City-

State agenda for investments, legislation, development projects, infrastructure, and long-term, transformative initiatives. In December 2022, the Panel released a strategic report entitled **Making New York Work For Everyone**. The plan developed actionable strategies for the recovery and resilience of the city's commercial districts. The report's workforce development recommendations included:



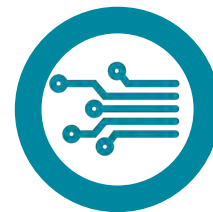
- Supporting summer youth employment programs and strengthening experiential learning opportunities;
- Redesigning a coordinated and collaborative workforce development ecosystem;
- Centralizing job-seeking experiences;
- Providing comprehensive and accessible workforce training and support to young people; and
- Reducing barriers to employment and establishing pathways for equitable community hiring.

The "New" New York Panel will continue to inform New York City's path to equitable economic recovery.



E. Technology

E1. TECHNOLOGY SECTOR OVERVIEW



New York City has become a leading global Technology hub over the past decade. Between 2011 and 2021, the Technology sector grew 81 percent to 190,916 workers. According to Lightcast, the Technology sector is projected to grow an estimated 28 percent in the next decade (2021-31). The New York City Technology sector (or broader Technology workforce ecosystem), which is vital to other significant industries such as finance, media, advertising, and health care, does not directly mirror the city's diverse population. Employment diversity in this sector falls below the New York City average for both percentage of racial and ethnic minority workers and women workers. Only 43 percent of Technology sector workers are racial minorities (vs. 53 percent citywide) and only 40 percent are female (vs. 52 percent citywide). Most jobs require a Bachelor's degree, but opportunities for workers with a high school diploma exist, including computer user support, customer service, and data analytics.

The overall talent pipeline for Technology workers continues to expand across New York City, and candidates with Technology skills can market themselves across multiple industries. The COVID-19 pandemic added to a Technology sector expansion due in part to increased demand for remote work infrastructure and IT security. Major Technology employers like Amazon, Apple, Facebook, Google and TikTok have all expanded in New York City in recent years; however, some of these companies have paused expansion in the short term.

New York City is growing its local, "homegrown" talent pipeline for this sector. Since 2018, CUNY has graduated more than 4,000 students with Technology degrees annually. Among all CUNY students enrolled in STEM programs, approximately half are Black and/or Hispanic, and roughly 71 percent of all CUNY students come from households earning less than \$40,000 per year.

SECTOR DEFINITION

The Technology sector as defined for this report includes a broad set of workers in what is known colloquially as the Technology ecosystem. Occupations in this ecosystem include jobs in traditional Technology industries—for example, a software engineer at Google; jobs that are non-Technology in Technology industries—for example, a human resources manager at Facebook; and Technology occupations in non-Technology industries—for example, a network security specialist at any number of Finance, Healthcare, Professional Services, Government, and Other industries. For the full list of subsectors and occupations included, please see Appendix B.

KEY METRICS

TOTAL JOBS
190,916

2021 estimate

GROWTH 2011-22
+81%

Estimated +28%, 2021-31

AVG. EARNINGS
\$216K

In 2021

% WOMEN
40%

43% Non-White

CONCENTRATION
2.32x

*More jobs than
national average*

COMPETITION
+27,684

*Jobs gained due to
regional competition*

STAKEHOLDERS ENGAGED

- Kingsborough Community College
- Pursuit
- Per Scholas
- Boyce Technologies
- Tech:NYC

KEY OCCUPATIONS

- Software Engineer
- Customer Service / Sales Representative
- Admin Support
- IT Support
- Cybersecurity
- Digital Gaming
- Web Programming / Design

KEY SKILLS

- Data Analysis
- Programming / Coding
- Network / Cloud Security / Blockchain
- User Experience / User Design (UX / UI)
- Computer Technology Industry Association (CompTIA) Certification
- Customer / Technology Support
- Project Management / Sales / Administrative

PROGRAM EXAMPLES

The NYC Tech Talent Pipeline (TTP). TTP is a Mayoral initiative and public-private partnership that seeks to connect employers, educators, and the City government with the purpose of growing New York City's Technology industry. Partnerships and programs within the TTP include higher-education Technology training, diverse hiring initiatives, and apprenticeship onboarding support. TTP also works closely with computer science faculty to connect companies and industry organizations with students. TTP, in collaboration with leading Technology businesses, has also designed fellowship and apprenticeship onboarding models to improve training and professional development for program participants.

CareerWise NYC. CareerWise New York is a nonprofit apprenticeship program that offers a three-year applied-learning environment for high school students. Students may focus their training and apprenticeships on information technology, financial services, and business. CareerWise New York utilizes an applied-learning environment where high school student apprentices spend part of their week learning at school and part of the week learning on the job. Sponsoring employers are provided with apprentice coaches as resources. Apprenticeship placements include junior coding, software testing, and computer technician support.

CUNY Upskilling. CUNY Upskilling is an online initiative started early in the COVID-19 pandemic to equip New Yorkers with the preparation and connections they need to launch and advance careers in high-demand fields such as Technology. The initiative allows 2,000 New Yorkers to take intensive skills building courses and provide credit toward future degrees. Courses include cybersecurity, CompTIA, and data analytics. In addition, the initiative provides coaching resources from industry mentors to prepare for job interviews and map out career paths.



E2. INSIGHTS

The consultant team interviewed stakeholders in the Technology sector including private employers, educators, and workforce development entities. A summary of findings is provided below.

Capacity is an issue at colleges and training facilities.

Demand outpaces supply of relevant internships, apprenticeships, and mentorship programs in the CUNY and SUNY systems. There is a need for additional commitments and collaborations between public educational institutions and the Technology industry to secure more experiential learning opportunities for potential employees.

Recent graduates need career development resources.

Although the Technology sector expanded at unprecedented levels, there are many students with Technology degrees who are “out of school and out of work.” Recent graduates from CUNY and SUNY schools are having difficulties navigating the job search process.

Training programs are needed for candidates with less than a college degree.

Start-ups and early-stage companies are expanding rapidly and need skilled jobseekers who can help launch their companies. In-demand positions include information technology, data analysis, business support, and operations. These positions may not require a college degree, but training is needed to ready these candidates for employment.

New York City affordability concerns are affecting worker retention.

Lack of affordable housing, childcare resources, financial aid, and transportation subsidies are very significant hurdles to recruiting and retaining employees in the region, especially as remote work or flexible work arrangements have become more commonplace in the Technology industry.

There is little awareness of Technology career paths outside of traditional Technology firms.

Demand exists for Technology jobs in non-Technology industries, for example, in Manufacturing and Marine Operations. Siloed training programs and lack of information about occupational pathways in non-traditional sub-sectors are impediments for industry’s ability to attract workers.

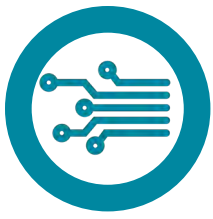
E3. TECHNOLOGY SECTOR IMPLEMENTATION PLAN

STRATEGIES	ACTION ITEMS	STAKEHOLDERS
1 Foster the K-12 Technology talent pipeline	<p>1A: Support parent-caregiver and teacher involvement to build Technology skills and career awareness</p> <p>1B: Work with industry partners to expand experiential learning opportunities and apprenticeships for high school students</p>	NYCDOE, Modern Youth Apprenticeship providers, Mayor's Office of Talent and Workforce Development, Apprenticeship Accelerator, training organizations, and private sector partners
2 Engage industry partners to align training and hiring needs for college and college-alternative students	<p>2A: Facilitate industry and post-secondary institution connections to reinforce and expand internship and hiring pipelines</p> <p>2B: Provide employers with technical assistance to scale up hands-on training and onboarding programs</p> <p>2C: Enhance professional development and networking resources to support students at college-alternative programs</p>	CUNY, Tech:NYC, NYC Tech Talent Pipeline, NY Jobs CEO Council, Mayor's Office of Talent and Workforce Development, training organizations, private sector partners
3 Bridge training gaps for transitioning workers and underserved communities	<p>3A: Connect individuals looking to transition or upskill with a single point of contact for wraparound services and training resources</p> <p>3B: Promote opportunities outside of traditional Technology firms</p>	Private sector partners, CUNY, training providers, multi-service non-profit organizations, NYC Workforce Development Board

THE JOBS AND OF TOMORROW



**CREATING THE JOBS AND
TECHNOLOGY OF TOMORROW**



TECHNOLOGY STRATEGY #1:

Foster the K-12 Technology talent pipeline

Early introduction of Technology skills builds an important foundation upon which more advanced concepts can be learned and expands access to Technology degrees and careers over the long term. These skills begin with basic computer and design fundamentals and then progress to computational thinking, coding, and programming.

NYCDOE plays an integral role in providing K-12 students with a solid Technology education yet more must be done to ensure that all students across the city have access to programs and resources. Technology enrichment must be paired with involvement, and even training opportunities, for both parents and educators. In order to strengthen the talent pipeline, an effective workforce strategy should also identify and expand those existing programs that connect New York City's many Technology industry leaders with the city's schools and K-12 population.

1A: Support parent-caregiver and teacher involvement to build Technology skills and career awareness

Community programs aimed at building K-12 students' Technology skills should provide parents, caregivers, and educators with resources to engage with students in computer science, coding, and design technologies. In each of these programs, there is an effort to close the "digital divide" and extend Technology skills and career information to underrepresented communities.

A comprehensive student program would include guest speakers and speaking panels, field trips to company worksites, and opportunities to learn directly from Technology professionals about their careers and skills requirements. In order to better reach parents, caregivers, and teachers, K-12 Technology organizations should advertise their programs through Parent-Teacher Organizations, Parent-Teacher Associations, and school administrators.

1A: Program Examples

Girls Who Code, STEM Kids NYC, and NYC Stem Education Network. These organizations currently provide resources and workshops for parents, caregivers, and teachers to get involved in Technology training alongside students. Technology training is provided through in-school programs, after-school programs, clubs, and summer programs/ camps.

Cornell Tech K-12 Initiative, NYC STEM Education Network, and NYCDOE's Computer Science For All. In these programs, teachers and school administrators receive extensive professional training on computer science curriculum, resources on building computer science culture, and support regarding Technology learning methods.

1B: Work with industry partners to expand experiential learning opportunities and apprenticeships for high school students

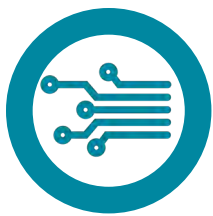
An effective workforce development strategy should facilitate collaboration between training providers, agencies, and employers to expand experiential learning opportunities. NYCDOE programs, such as Student Pathways, and mayoral initiatives, including Apprenticeship Accelerator, should take the lead in securing experiential learning and apprenticeship¹ host commitments from companies in the Technology industry. Coordinated efforts between these agencies on how to better direct youth to Technology sector apprenticeships and internships will ensure the steady flow of program participants and increase the Technology talent pipeline in the city.

¹ **Apprenticeships** combine paid on-the-job training with classroom instruction to prepare workers for highly-skilled careers. A registered apprenticeship is a formal training relationship between an employer and an employee where the work agreement is approved and registered by the New York State Department of Labor.

1B: Program Examples

Apprenticeship Accelerator. In his January 2023 State of the City, Mayor Adams announced the creation of the Apprenticeship Accelerator and prioritized the growth of information technology apprenticeships. The Accelerator has a goal of connecting 30,000 New Yorkers to apprenticeships by 2030. The Accelerator is focused on improving youth employment and providing technical assistance to expand apprenticeship programs by employers, training providers, educational institutions, and labor unions. The Accelerator will run in partnership with NYCDOE's Student Pathways program.

NYCDOE Student Pathways. The Student Pathways program provides career-connected learning opportunities for New York City public school students. Building on New York City public schools' Computer Science for All initiative, the NYCDOE announced the creation of the Career Readiness and Modern Youth Apprenticeship program and the FutureReadyNYC program as part of its Student Pathways program. Career Readiness and Modern Youth Apprenticeship connects 3,000 students across more than 50 schools with paid multi-year apprenticeships in Technology, Finance, and Business. FutureReadyNYC - the second of the Pathways pilot programs - gives participating New York City public high school students access to career exploration through credit-earning internships in high-growth fields including Technology.



TECHNOLOGY STRATEGY #2:

Engage industry partners to align training and hiring needs for college and college-alternative students

Employees require significant training for early-career Technology positions and on-the-job responsibilities. Stakeholders expressed that some recent college graduates lack job readiness and experienced difficulties navigating job searches. This early training gap makes it difficult for aspiring workers to meet employer needs and expectations. In addition, college-alternative Technology programs seek to address employer training needs, but may need additional mentorship and networking resources. Expanding partnerships between academia, training programs and employers is necessary for success, and can include hands-on training, internships, mentorships, and coding and programming bootcamps.

2A: Facilitate industry and post-secondary institution connections to reinforce and expand internship and hiring pipelines

A consistent feedback loop is needed between employers and post-secondary institutions to update curricula and to assess internship capacity. Training providers should deploy additional employer relations specialists and industry liaisons to interact with employers in the Technology sector on their skills and hiring needs.

Furthermore, institutions can facilitate student-employer interactions through volunteer teaching opportunities for Technology workers and class visits for recruiters. These interactions may provide students with insights into the post-graduation job recruitment process and help prepare them for technical interviews. For smaller companies and start-ups that may not be able to provide paid internships, employers may be able offer mentorship and host career exploration events.



2A: Program Examples

CUNY Tech-in-Residence Corps. As part of the CUNY 2X Tech initiative, the Tech-in-Residence Corps invites Technology professionals into CUNY classrooms to teach advanced elective courses in software engineering and data analytics. The city-wide program emphasizes industry-academic collaboration between CUNY faculty and students and a pool of about 60 professional corps members from more than 40 different Technology employers. The program gives students access to up-to-date industry practices while providing industry professionals with exposure to the CUNY talent pool.

CUNY Inclusive Economy Initiative. This initiative provides student support in finding paid internships. More than 3,000 students per year at five CUNY campuses participate in this program that embeds industry specialists and hybrid career advisers. In addition to generating leads on new internships, the in-house Technology industry specialists and career advisers facilitate industry-academic collaboration to bolster student preparation, and align curriculum to reflect changing employer needs and trends.

2B: Provide employers with technical assistance to scale up hands-on training and onboarding programs

Scaling up hands-on training and onboarding programs necessitates technical support or skilled intermediaries who can assess the best way to incorporate such programs for recent Technology graduates. These intermediaries can assist with onboarding models for Technology employers to find, hire, and train qualified local Technology talent.

An intermediary should work with Technology companies to tailor onboarding models that facilitate implementation of effective experiential training programs and encourage worker retention. The newly formed Future of Workers Task Force under the Mayor's Office of Talent and Workforce Development may coordinate additional alignment with the private, nonprofit, and philanthropic sectors.

2B: Program Examples

NYC Tech Talent Pipeline. NYC Tech Talent Pipeline works with bootcamps and Technology employers to develop and scale-up experiential training programs. Tech Talent Pipeline uses a customizable onboarding model which enables companies to create a longer-term hiring solution, find talent from traditionally overlooked sources, and onboard talent in a way that leads to increased retention. Program participants are provided with onboarding training and mentorship resources while being introduced to technology and tools.

2C: Enhance professional development and networking resources to support students at college-alternative programs

There are several college-alternative programs that prepare adult workers for careers in Technology. Even though these programs have strong employer relationships and dedicated internship pipelines, graduates may still face barriers trying to break into the Technology sector without a college degree.

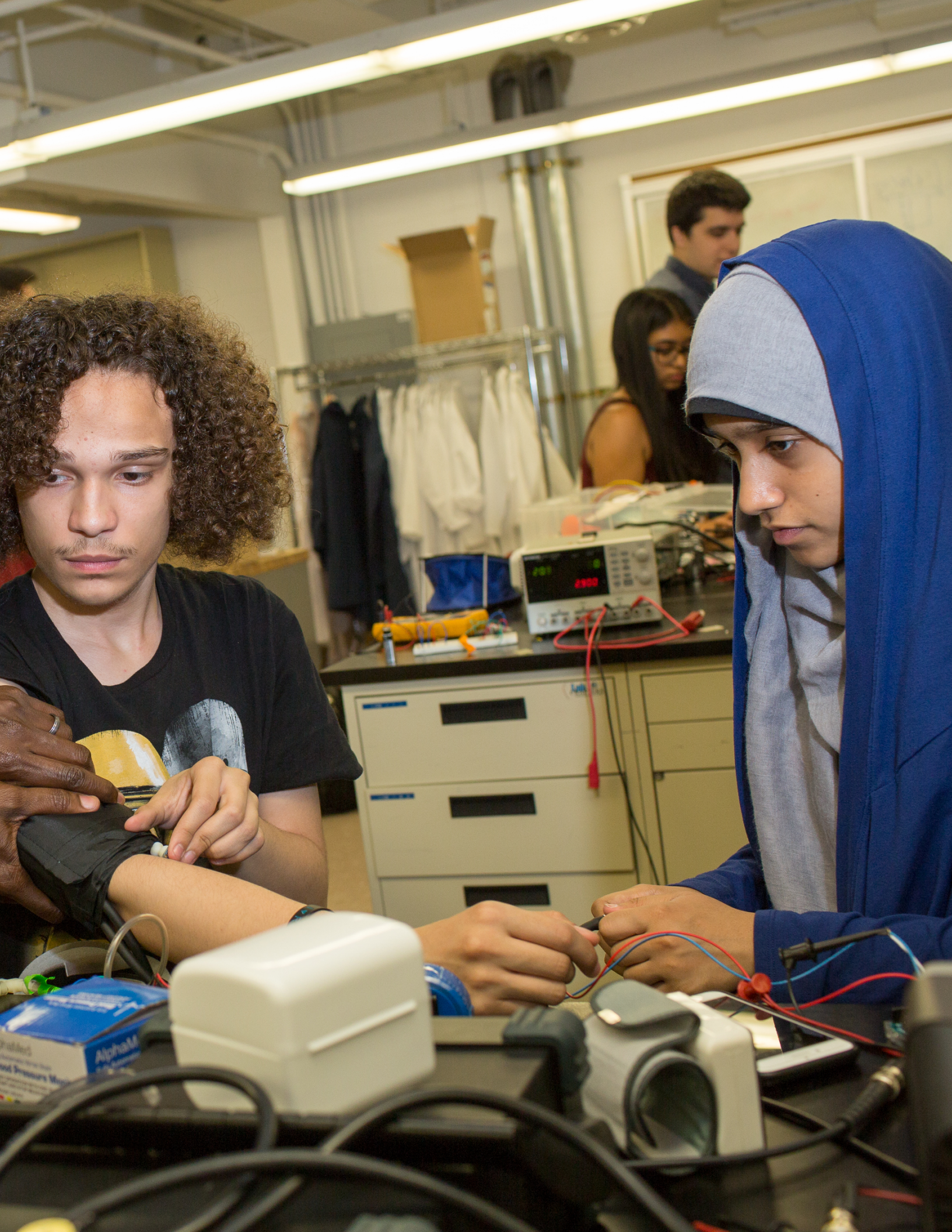
Training providers should coordinate with Technology employers to provide professional development and networking resources including career coaching and mentorship. Mentors or career coaches may help students and interns navigate their work placements, job searches, and interview preparation. Tech:NYC, NY Jobs CEO Council, and the Future of Workers Task Force may provide training providers with a network of contacts to attract new private sector partners for marketing efforts, internship hosting, and mentorship recruitment.

2C: Program Examples

Pursuit. Pursuit is a nonprofit, fellowship program that provides Technology apprenticeship-like experiences for its participants in the software engineering space. Pursuit is focused on training adults from underrepresented communities, and provides work placements, individual mentorship, and coaching for full-time employment. Pursuit's instructional team carefully curates student work placements based on employer feedback and evaluations of host employer needs.

Marcy Lab School. Marcy Lab School is a New York City-based nonprofit that provides young adults from underrepresented backgrounds with the skills and networks necessary to launch rewarding careers in Technology. Marcy Lab School offers a 12-month, tuition-free, full-time program that prepares students for full-time careers in software engineering. In addition, students are provided with mentorship contacts, career counseling, and leadership training.







TECHNOLOGY STRATEGY #3:

Bridge training gaps for transitioning workers and underserved communities

As New York City enters a potentially more competitive and challenging economic environment in the short-term, strengthening transferable and adaptable skills of Technology workers will reinforce workforce resiliency. The city and workforce development stakeholders are addressing rapidly evolving workforce needs of a dynamic sector by providing skills training and creating varied pathways for individuals seeking to transition into the sector.

3A: Connect individuals looking to transition or upskill with a single point of contact for wraparound services and training resources

Training programs and community-based organizations should offer a single point of contact to support workers that are transitioning into the Technology with wraparound services and other resources. The single point of contact would facilitate bundling and co-enrollment of funding opportunities including transportation, housing, food, financial coaching, and other supportive programs.

The single point of contact may also guide participants into areas of education necessary for advancement in the field of Technology and determine if funding is available to complete credentials or other required certification. Once the participant completes training or finds employment, providers should offer post-hiring, frequent case management services to keep participants engaged and on a successful path.

3A: Program Examples

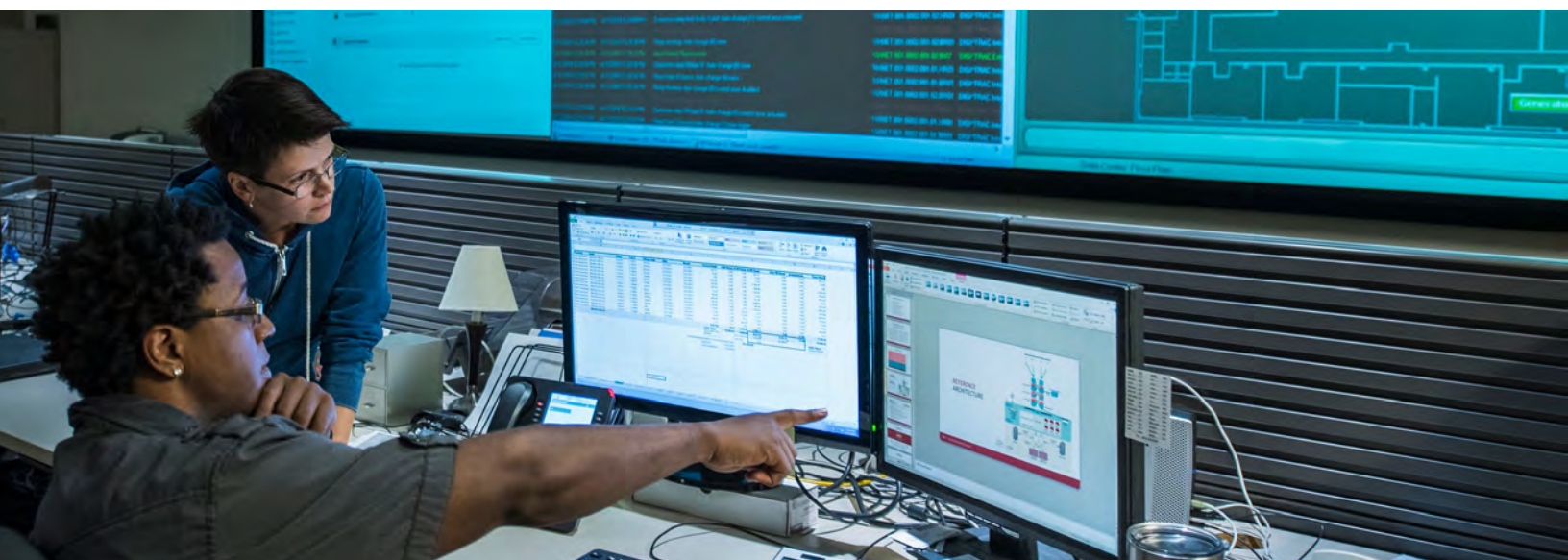
Brooklyn Workforce Innovations. Brooklyn Workforce Innovations is a nonprofit helping those with significant barriers to employment start new careers with long-term potential. Brooklyn Workforce Innovations' Kindwork Customer Experience Fellowship provides a single point of contact and entry point for its participants in a variety of early career sectors including Technology. The program combines training, mentorships, and access to additional support, such as transportation assistance, into one 15-month program. Further, participants have a point of contact that coordinates benefits for housing, food, financial coaching, and other support.

Per Scholas. Per Scholas is a New York City-founded, national nonprofit organization that works with employers to design bootcamp-style, tuition-free courses focused on information technology, cybersecurity, and other Technology skills. In addition, the organization conducts multifaceted marketing and outreach in underrepresented communities to attract jobseekers looking to transition into Technology. After training completion and job placement, Per Scholas provides continued upskilling and professional development support to alumni up to two years post-graduation.

3B: Promote opportunities outside of traditional Technology firms

To strengthen the diversity of the sector, non-traditional Technology firm employers should promote job opportunities with transitioning workers and jobseekers from underrepresented communities. Some employers in these sectors, such as Technology Manufacturing and Marine Technology, offer a pathway into the Technology sector through entry-level jobs and on-the-job training opportunities.

Outreach efforts may prioritize underrepresented communities within Technology, especially women and minorities, and neighborhoods with high levels of unemployment. Training providers and employers should engage in multi-pronged marketing efforts to help identify individuals interested in jobs outside of traditional Technology firms. Marketing should include social media, online and physical leafleting, as well as local information sessions.



F. Life Sciences



F1. LIFE SCIENCES SECTOR OVERVIEW



In recent years, the Life Sciences sector in New York City has expanded to record highs in employment, public funding, and ability to attract venture capital and other forms of private investment. Public and private support, quality research institutions, and a talented labor force have helped draw companies to the region. Total employment in the Life Sciences sector in New York City over the next decade is expected to increase 41 percent above the 18,225 jobs as of 2021. Furthermore, with Life Sciences expanding in the Mid-Hudson region (Regeneron) and Long Island (Cold Spring Harbor Laboratory), there is a need for interregional cooperation on workforce development initiatives.

Another positive signal for the sector's workforce efforts, as part of the LifeSci NYC initiative, the New York City Economic Development Corporation (NYCEDC) is currently soliciting proposals for the creation of talent and workforce development programs to grow, upskill, and diversify the local Life Sciences talent pool. On the physical capacity side, a growing number of Life Sciences hubs and incubators have recently been established in the city. Examples include BioBAT at Brooklyn Army Terminal, biomanufacturing facilities in the Brooklyn Navy Yard, privately sponsored laboratory spaces in Long Island City, and an incubator at SUNY Downstate in Central Brooklyn.

SECTOR DEFINITION

The Life Sciences sector includes research and development (biotechnology, medical, physical sciences, and engineering), laboratories and diagnostic imaging, and manufacturing (biological, medical, and pharmaceuticals). For the full list of subsectors included, please see Appendix B.

KEY METRICS

TOTAL JOBS
18,225

2021 estimate

AVG. EARNINGS
\$163K

In 2021

CONCENTRATION
0.61x

Less jobs than national average

GROWTH 2011-21
+37%

Estimated +41%, 2021-31

% WOMEN
58%

54% Non-White

COMPETITION
+2,726

Jobs gained due to regional competition

STAKEHOLDERS ENGAGED

- BioLabs @ NYU Langone
- Harlem BioSpace
- BioBAT
- Envisagenics
- NYCEDC Initiatives - LifeSci NYC

KEY OCCUPATIONS

- Lab technician / support
- Phlebotomist
- Programming / data science
- Sales representative
- Customer support
- Project management
- Administrative / human resources

KEY SKILLS

- Wet laboratory skills and specimen collection
- Programming / coding
- Data analysis
- Chemistry / biochemistry
- Sales / customer support
- Quality control / quality assurance
- Project management
- Human resources

PROGRAM EXAMPLES

HYPOTHEkids. HYPOTHEkids is a Science, Technology, Engineering, and Math (STEM) education and youth development initiative that supports students of all ages from underserved communities across the city. It strives to create a STEM talent pipeline representing the city's diversity. The program provides underserved students with hands-on science and engineering educational and mentorship experiences so that they can thrive in the Life Sciences economy of tomorrow.

STEM Kids NYC. STEM Kids NYC is a nonprofit organization offering year-round, after-school STEM education programs to K-12 students. The organization provides weekend programs where participants receive lessons on Life Sciences, coding, and other related areas. The program provides students with an understanding of STEM electives, majors, and careers.

BioBus. BioBus is a nonprofit, mobile laboratory program that helps K-12 and college students in New York City discover, explore, and pursue science. BioBus has reached 300,000 students at more than 800 schools and community organizations since 2008. BioBus participants engage in science labs aboard mobile labs at schools; after school, weekend, and summer programs; and year-long internships. Programs are held city-wide with a focus on Harlem, the South Bronx, and the Lower East Side.



F2. INSIGHTS

The consultant team interviewed stakeholders in the Life Sciences sector including private employers, educators, City agencies, and workforce development entities. A summary of findings is provided below.

Employers in the Life Sciences sector are hiring candidates with advanced degrees even when the position does not require one.

Candidates without college degrees or graduates of community college experience difficulties obtaining job placements or internships due in part to “degree inflation” and a lack of skills-based hiring approaches by early-stage Life Sciences companies. Further, though employers may see the need to change hiring practices, many have not made the shift to a more skills-based approach that would increase the number of non-degreed individuals in the sector.

Early-stage companies have needs to fill administrative or project management jobs but are risk averse to expanding in general and overhead functions. After companies move past the early-stage, they are able to offer a broader range of internships and positions including sales, customer service, and operations.

Training programs are limited for low- and mid-skill positions.

There is a demand for low- and mid-skill positions within early-stage and larger Life Sciences companies. Unfortunately, at the same time, there is a lack of programming to support the training needs associated with bringing candidates, without advanced degrees, to the appropriate skill levels to fill these positions.

Top skills sought by New York City employers for Life Sciences occupations requiring less than a Bachelor’s degree include data entry, specimen collection, phlebotomy, sales, and billing.

“Wet lab” and “dry lab” research positions require additional training opportunities in computational skills.

Although “wet lab” jobs are in-demand, the Life Sciences sector in general has seen a shift from “wet lab” research to more “dry lab” data analysis and computational research. This has resulted in a significant increase in need for data analysis and software development among Life Sciences employers.

Smaller employers do not have the capacity to develop experiential learning programs.

The city has become a hub for start-ups and early-stage companies, and opportunities are needed to expand training and apprenticeship programs and to increase job placement as the sector expands. However, many smaller companies lack the capacity or the inclination to provide internships or career pathways.

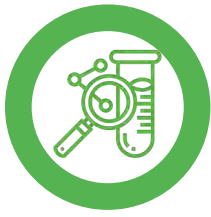
Diversity and outreach to underrepresented communities is a concern amongst stakeholders.

Stakeholders expressed that there is a need to attract more underrepresented communities including Black and Hispanic / Latino individuals into Life Sciences careers.

F3. LIFE SCIENCES SECTOR IMPLEMENTATION PLAN

STRATEGIES	ACTION ITEMS	STAKEHOLDERS
1 Promote hands-on learning opportunities for students of all ages	1A: Scale up immersive, hands-on K-12 Life Sciences programs that provide skills building and career discovery 1B: Expand internships to provide hand-on experiences for college and graduate students	NYCDOE, New York City Career and Technical Education, CUNY, NYCEDC LifeSci NYC, Life Sciences training organizations (e.g. BioBus, HYPOTHEkids, STEM Kids NYC), private sector partners
2 Support training for in-demand entry-level positions	2A: Expand wet lab training programs for laboratory technicians, biological technicians, and phlebotomists 2B: Coordinate with existing college programs to create a pipeline for Life Sciences computational and business support positions	Private sector partners, Life Sciences incubators and lab spaces (e.g. BioBAT, Harlem Biospace, BioLabs@NYU), CUNY, NYCEDC LifeSci NYC
3 Evaluate recruitment and onboarding practices to increase diversity	3A: Coordinate with Diversity, Equity and Inclusion specialists to encourage skills-based hiring and training practices in Life Sciences 3B: Create a online job and resources portal targeting diverse and underrepresented candidates	Diversity, Equity and Inclusion specialists, Life Sciences incubators and lab spaces (e.g. BioBAT, Harlem Biospace), CUNY, NY Jobs CEO Council, NYCEDC LifeSci NYC, private sector partners





LIFE SCIENCES STRATEGY #1:

Promote hands-on learning opportunities for students of all ages

The growth of New York City's Life Sciences industry depends on attracting and retaining a steady stream of vibrant and engaged students from K-12 through college and graduate school. Opportunities for hands-on learning and career exploration provide students with exposure to the essential skills and possible career paths. However, Life Sciences organizations focused on K-12 audiences are limited in scale and require additional resources to expand. At the college and graduate school level, Life Sciences internships provide valuable hands-on experiences in laboratory and incubator settings. However, these internships are extremely competitive, and the number of applications far exceed available positions. Outreach and partnership efforts with educational institutions and employers are needed to develop clear entry points to occupations in the industry.

1A: Scale up immersive, hands-on K-12 Life Sciences programs that provide skills building and career discovery

An ideal Life Sciences program aimed at building Life Sciences skills for K-12 students may include science clubs, school lab trainings, and summer immersion programs. In addition, to support career exploration, schools may also facilitate college classroom visits, career fairs, industry events, and industry partner internships to give students opportunities to learn directly from Life Sciences professionals about their careers and skills requirements. Programs that incorporate hands-on lab-based Life Sciences activities and experiments often occur at a local academic institution or an industry partner site in the area, and thus, provide further awareness of STEM working environments.

NYCDOE and New York City Career and Technical Education (CTE) should explore options to expand Life Sciences tracks to provide additional elective courses and hands-on experiences for high school students. Life Sciences-oriented CTE streams for biotechnology and laboratory technicians are currently available at a few New York City schools and enable students to gain exposure to these occupations.

1B: Expand internships to provide hand-on experiences for college and graduate students

Internships provide students with hands-on learning experiences in a professional environment and exposure to career paths. NYCEDC's LifeSci NYC and educational institutions such as CUNY should continue their expansion of internship commitments from Life Sciences companies. In turn, employers should coordinate with educational institutions and internship program coordinators on career development needs to support internship field work, inform program outcomes, and share program learnings.

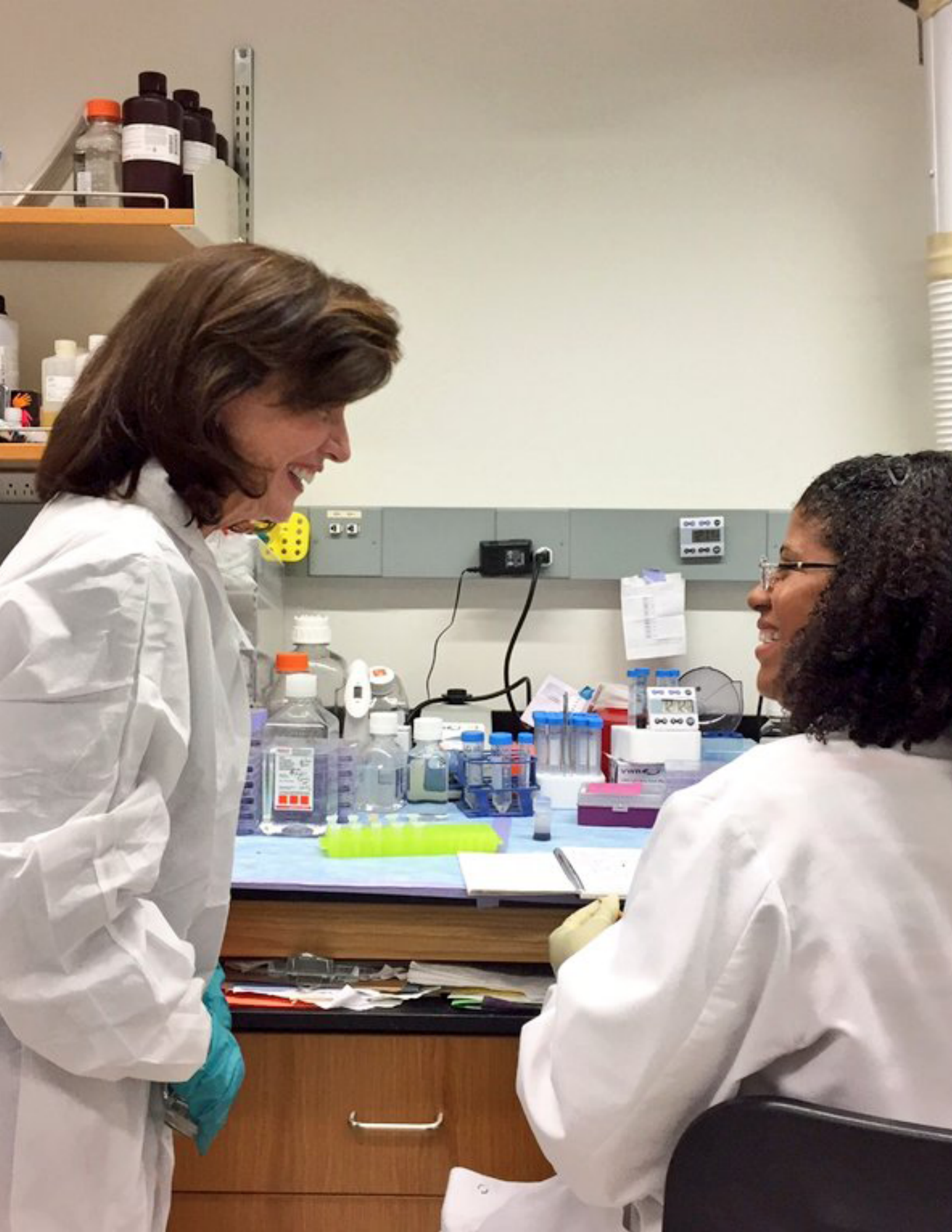
Some private sector stakeholders reported interest in offering internships in Life Sciences but were not aware of the proper contacts within educational institutions. Internship program coordinators should have a dedicated relationship manager or industry liaison for employers to maintain and grow the pool of work placements.

1B: Program Examples

LifeSci NYC Internship Program. The LifeSci NYC Internship Program, an NYCEDC initiative, is currently providing paid internships in Life Sciences companies for undergraduate and graduate students, while providing private partners with diverse talent and support across scientific and business functions. The internship program, which began in 2017, has been extremely successful, placing over 440 New York City students at more than 120 leading Life Science companies. LifeSci NYC has been successful in building its network of industry partners to develop relevant work placements for students. In March 2022, LifeSci NYC released a request for proposals to identify an organization that will manage the program, recruit students and host companies in the city, and organize skills enrichment programming and activities for applicants and interns.

New York BioForce. As part of HYPOTHEKids, New York BioForce is a program that provides high school students from underrepresented communities with after-school intensive lab training instruction. In addition, students are offered paid six-week summer internships in Life Sciences industry research labs at Columbia University and Weill Cornell Medicine. This program aims to prepare students for higher education in STEM fields and to become the next generation of scientists conducting essential Life Sciences research.







LIFE SCIENCES STRATEGY #2:

Support training for in-demand entry-level positions

New York City is investing in new spaces, companies, and talent in Life Sciences while catalyzing startups and supporting scientific breakthroughs. Many sector jobs require a Bachelor's or Graduate degree for entry, though some of the fastest growing and hard-to-fill occupational needs in the Life Sciences sector do not necessarily require higher-education credentials. These in-demand jobs include “wet lab” support positions such as laboratory technician, phlebotomists, and biological technician. In addition, positions relating to business operations and computation include administrative support, customer relations, sales, data analysis, and software engineering. Although some of these positions do not require a college degree, additional training is often needed.

2A: Expand wet lab training programs for laboratory technicians, biological technicians, and phlebotomists

Hands-on training at incubator or employer laboratories is a way to increase wet lab skills for in-demand phlebotomists, laboratory technicians, and biological technicians. Certification programs for these occupations may develop an on-site training component where students may work part-time for credit. Students would have an opportunity to gain practical hands-on experience that provides exposure to testing, safety protocols, and equipment. If sufficient on-site training facilities do not exist, physical improvements may be needed to build new dedicated lab space. Educational institutions or employers may provide access to classes or training labs that replicate working environments.

In addition, micro-credentials¹ could serve as an alternative training pathway for key skills including lab safety and phlebotomy. Outside the New York City region, SUNY campuses in Upstate New York are offering micro-credentials in phlebotomy, clinical research, laboratory testing. Training providers must ensure that employers understand the micro-credentials and assess how the programs relate to the employers' needs.

1 Micro-credential programs are intensive trainings designed by academic institutions in partnership with industry leaders, that certify that a student has mastered specific skills or competencies in an area directly associated with specific occupations. The process for obtaining college credit for badges created for this strategy may involve new agreements between the agencies issuing the badges and potential participating college(s).

2B: Coordinate with existing college programs to create a pipeline for Life Sciences computational and business support positions

Life Science companies, even at the early-stage level, are in need of computational and business support functions. These occupations include software engineering, data analyst, computational biologist, information technology, customer service, sales, and office administration. Although some of these support functions may not require a college degree in Life Sciences, stakeholders noted that a basic understanding of Life Sciences and industry dynamics is ideal.

Employers and incubators should coordinate with educational institutions, such as CUNY and SUNY, to develop courses or training programs for data analysis, business services, and office administration students that are interested in working within Life Sciences environments. A Life Sciences-oriented course or training program should combine occupational skills with the study of basic biological and chemical principles, background on the Life Sciences industry, and Life Sciences clinical and laboratory procedures.

Training providers can also establish micro-credential certification programs for computational and business support skills in Life Sciences. In 2021, CUNY and the NY Jobs CEO Council launched the EverUp Micro-Credential Program which introduced online training for in-demand skills including data analytics, project management, software engineering, and systems administration.







LIFE SCIENCES STRATEGY #3:

Evaluate recruitment and onboarding practices to increase diversity

The Life Sciences sector is in need of strategies to cultivate a broader and more diverse workforce in terms of gender, race, and educational attainment. Although the sector has made great strides in terms of gender and racial representation, efforts are needed to reach out and train underrepresented communities including Black and Hispanic / Latino jobseekers.

3A: Coordinate with Diversity, Equity and Inclusion specialists to encourage skills-based hiring and training practices in Life Sciences

Diversity, Equity and Inclusion organizations can work with Life Sciences employers to develop needed training programs for skills-based hires without college degrees. Working with talent acquisition and workforce development specialists within a Life Sciences organization, Diversity, Equity and Inclusion specialists may help create tailored onboarding and training practices. Successful programs will integrate workers to company culture, deliver instruction on tools and roles, and provide professional development resources. Stakeholders such as the Future of Workers Task Force and LifeSci NYC would be ideal venues to convene conversations between Life Sciences employers and incubators to establish best practice approaches in encouraging skill-based hiring approaches for incorporating entry-level workers sector-wide.

3A: Program Example

Grads for Life. Grads for Life is a Diversity, Equity and Inclusion organization that is dedicated to closing the opportunity gap for underserved individuals. The organization works with companies to introduce skills-based hiring approaches and recruitment. Using data-driven approaches, transitioning to a skills-based hiring approach requires employers to identify early-career and mid-career roles, create inventories of minimum qualifications and competencies, and assess opportunities to enhance equity and mobility.

3B: Create an online job and resources portal targeting diverse and underrepresented candidates

Employers and jobseekers would both benefit from a portal designed to promote diversity initiatives and assist underrepresented candidates. An online jobs and resources portal can better inform jobseekers about the opportunities and occupations that exist in the broader Life Sciences sector.

The online portal should include resources for employers to facilitate linkages to job applications, resource programs, and Diversity, Equity, and Inclusion training. In addition, the portal should also provide information on jobs, apprenticeships, and internships, as well as opportunities for upskilling through postsecondary and skills training programs offered by colleges and workforce training providers. Lastly, the portal should include links to diversity organizations and minority-owned businesses.

3B: Program Example

BioLabs@NYU. BioLabs@NYU is a co-working space for growing life science companies. BioLabs, the parent company of BioLabs@NYU, provides an online portal specifically designed to match external and internal workers with jobs in the Life Sciences. In addition, the portal also provides a number of Diversity, Equity and Inclusion resources including minority-owned life science companies, mentorship and internship opportunities, and courses offered to become educated and certified on Diversity, Equity and Inclusion topics.

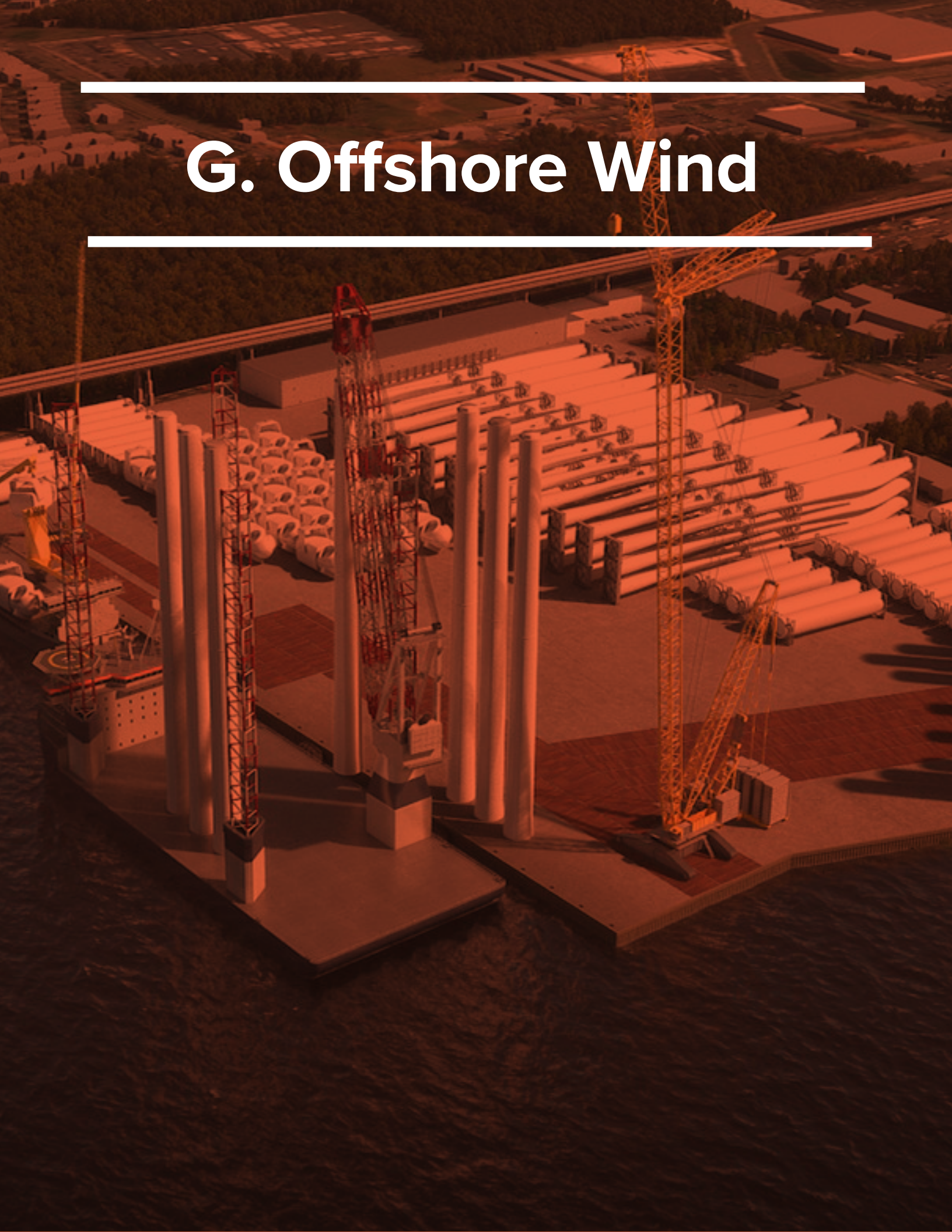
“Our economic recovery and future prosperity depend on the diverse talents of all New Yorkers connecting to and helping to create opportunity. Talent is New York City’s most important resource, and what makes our city great.

”

Stakeholder Interview
Participant



G. Offshore Wind



G1. OFFSHORE WIND SECTOR OVERVIEW



The Offshore Wind sector is pivotal in supporting City and State initiatives to cut greenhouse gas emissions and increase clean energy generation. In September 2021, the City announced a commitment of \$191 million in Offshore Wind investments that would create at least 13,000 jobs in the five boroughs. In her 2022 State of the State address, Governor Kathy Hochul announced that New York State Energy Research & Development (NYSERDA) will oversee the implementation of a \$500 million investment proposal for offshore wind ports, manufacturing, and supply chain infrastructure. Over the past decade, Offshore Wind jobs in New York City have increased by ten percent¹ and are projected to expand even more with the construction of wind farm facilities in the region. Prominent examples of future port facilities include the South Brooklyn Marine Terminal and the Arthur Kill Terminal on Staten Island.

As the industry grows in the city, institutions, unions, and employers are collectively addressing shortages in in-demand skills and occupations in Electrical, Marine Operations, Manufacturing, and Construction industries. In addition, with Offshore Wind manufacturing expansion in the Capital Region and additional Offshore Wind farms constructed off Long Island, there is a need for interregional cooperation on workforce development.

The Global Wind Organization (GWO) is a non-profit body founded by wind turbine manufacturers and owners and is charged with establishing common international standards for safety training and emergency procedures. Community colleges in the region, in partnership with Offshore Wind developers, are working on achieving GWO certification standards in order to train future employees.

¹ The City and NYCEDC are currently studying the Offshore Wind and Green Economy sectors. Growth projections may differ based on how the sector is defined. For a full list of subsectors included within Offshore Wind, please see Appendix B.

SECTOR DEFINITION

The Offshore Wind sector includes businesses involved in power generation, marine and offshore operations, and transmission of energy derived from renewable wind sources. It also includes businesses that manufacture and install the parts and components required for developing offshore wind turbines and farms. For a full list of subsectors included within Offshore Wind, please see Appendix B.

KEY METRICS

TOTAL JOBS
13,066

2021 estimate

AVG. EARNINGS
\$137K

In 2021

CONCENTRATION
1.72x

More jobs than national average

GROWTH 2011-22
+10%

Estimated +10%, 2021-31

% WOMEN
21%

50% Non-White

COMPETITION
+277

Jobs gained due to regional competition

STAKEHOLDERS ENGAGED

- Manufacturing and Industrial Innovation Council
- NYCEDC Initiatives - Smart and Sustainable Cities
- LaGuardia Community College
- Orsted
- SUNY Maritime
- Joint Industry Board of the Electrical Industry and International Brotherhood of Electrical Workers (IBEW) - Local 3

KEY OCCUPATIONS

- Electrician / Electrical Maintenance
- Electrical / machine operations
- Construction
- Manufacturing support
- Field operator
- Maritime / port operator
- Draftsperson

KEY SKILLS

- Electrical / hydraulics skills
- Machine / energy operations
- Construction / tools / welding
- Drawings / schematics
- Mathematics
- Marine / port operations
- Sea safety training
- Swimming
- Working at heights
- Computer skills

PROGRAM EXAMPLES

LaGuardia Community College. LaGuardia Community College is partnering with Siemens Gamesa to develop programs for the construction, repair, and maintenance of Offshore Wind facilities in the New York City metro area. The college is convening employers to detail the skill gaps for new entrants to the construction trades and to help inform and develop a best-in-class custom curriculum. The college estimates that a total of fifty low-income individuals from the Brooklyn-Queens waterfront will be trained to work as Offshore Wind technicians in its inaugural class.

CUNY Green Technology Workforce

Development. CUNY recently announced a \$3.8 million partnership with the New York City Economic Development Corporation that will allow CUNY to train hundreds of additional students each year for careers in the development of electric cars, offshore wind turbines, solar, and other growth industries in the renewable energy sector.

PLAN EXAMPLE

NYCEDC Offshore Wind Plan: Equitable Opportunity For A Sustainable Future.

Released in 2021, the NYCEDC Offshore Wind Plan highlights goals and strategies for the City to leverage its expertise in maritime infrastructure development, world-class talent base and workforce development system, and capacity for innovation across sectors. The City is focused on developing best-in-class infrastructure that will support the construction and operation of Offshore Wind; preparing local workers and businesses to seize upon the opportunities that will be created by infrastructure investments; and promoting innovation in Offshore Wind to ensure that new technologies and approaches are created in New York City.





G2. INSIGHTS

The consultant team interviewed stakeholders in the Offshore Wind sector including private employers, educators, City agencies, and workforce development and labor entities. A summary of findings is provided below.

There is a lack of awareness of the various careers in the Offshore Wind sector.

Even those jobseekers who are aware of the Offshore Wind sector generally may not be aware that Offshore Wind occupations typically do not require college degrees and offer competitive wages. To attract talent, employers need to communicate to graduates, women, and minorities in adjacent fields that Offshore Wind provides a variety of skilled jobs with opportunities for advancement.

The worker pipeline for Offshore Wind has been slow to develop.

Because this is a nascent sector in New York City, there is a need for educational institution partners to lay the groundwork for Global Wind Organization (GWO) training and to attract individuals with related skill sets (electrical, plumbing, welding, construction, engineering). There is a need to develop partnerships with unions and work with employers to create career ladders.

The technical training needs for Offshore Wind jobs are wide-ranging and multi-disciplinary.

Overarching skills required for non-degree jobs in the Offshore Wind industry include sea safety (e.g., swimming, first aid, sea survival), manufacturing, operations, and maintenance (e.g., welding, machining). Training providers need to focus on soft skills enrichment including professionalism, communication, and teamwork.

The challenging work environment is a barrier to participation.

Offshore wind facilities proximate to New York City are located 15 miles off the coastline. Offshore work usually requires two weeks onshore and two weeks offshore at a time. Finding jobseekers who can commit to these schedules is a challenge for employers.

Wraparound services are needed to expand the workforce.

Lack of affordable housing, childcare needs, and transportation challenges are very significant hurdles to recruiting and retaining Offshore Wind employees in New York City. Transportation subsidies may be needed for commuting to port locations. In addition, due to the on-site work schedules, childcare resources may be needed for workers with children. Wraparound services are crucial to increasing hiring outcomes with women, parents, and underrepresented communities.

G3. OFFSHORE WIND SECTOR IMPLEMENTATION PLAN

STRATEGIES	ACTION ITEMS	STAKEHOLDERS
1 Create awareness for the sector	<p>1A: Create outreach campaigns to spotlight Offshore Wind opportunities</p> <p>1B: Conduct targeted outreach including communities with future wind turbine port facilities</p> <p>1C: Advertise the sector through water safety and swimming programs</p>	NYCDOE (CRMYA), NYSERDA, SUNY Maritime, CUNY, Global Wind Organization training partners, NYC Workforce Development Board, community-based organizations, multi-service nonprofit providers, private sector partners
2 Expand multi-disciplinary training capacity through coursework and apprenticeship	<p>2A: Support training and micro-credential development at colleges and Global Wind Organization (GWO) partners</p> <p>2B: Work with industry partners to establish and expand job training and apprenticeship programs</p>	International Brotherhood of Electrical Workers Local 3, NYSERDA, CUNY, SUNY Maritime, Global Wind Organization training partners, private sector partners
3 Enhance recruitment and upskilling of workers in adjacent fields to meet hiring demand	<p>3A: Coordinate with unions, trades, and professional industry organizations on outreach and upskilling for the existing workforce</p> <p>3B: Provide ongoing mentorship and programming support for transitioning workers</p> <p>3C: Integrate wraparound services that adequately respond to the unique features of Offshore Wind employment schedules and travel</p>	International Brotherhood of Electrical Workers Local 3, CUNY, SUNY Maritime, Global Wind Organization training partners, NYC Workforce Development Board, Community-based organizations, multi-service nonprofit providers, private sector partners



OFFSHORE WIND STRATEGY #1:

Generate awareness for the sector

As the Offshore Wind sector expands within New York City, there is an urgent need to develop a qualified workforce. Of all the priority industries, Offshore Wind jobs and related occupations lack widespread awareness. Efforts are needed to orient students and their families to Offshore Wind career paths and to learn about blue collar jobs, including electricians, and manufacturing and construction workers. In addition, outreach efforts should focus on communities where future wind turbine port facilities have been announced, for instance in Brooklyn and Staten Island, as well as in other areas where there are high concentrations of related fields such as construction.

1A: Create outreach campaigns to spotlight Offshore Wind opportunities

Program coordinators should support industry labor needs by highlighting the sector's transferable skills, leadership opportunities, competitive wages, and job training resources. Educational institutions can organize onsite events at maritime ports, assembly plants, and Offshore Wind facilities as developed that may increase awareness of the industry to potential workers. Career exploration activities should bring potential workers closer to the type of environments and experiences one would face on the job.

1A: Program Examples

SUNY Maritime College. SUNY Maritime College is hosting middle school students from underrepresented communities for "NYC Student Day: Youth Power and Offshore Wind" to introduce a younger audience to the Offshore Wind industry.

NYSERDA Offshore Wind Youth Action (OWYA). Educators may engage NYSERDA's OWYA program as a tool to increase awareness of Offshore Wind opportunities. OWYA is an initiative to empower young people across New York State to learn about Offshore Wind as a clean energy action in their communities. OWYA provides resources including workshops, webinars, and educator guides.

1B: Conduct targeted outreach including communities with future wind turbine port facilities

To help promote Offshore Wind job opportunities, employers should develop workforce partnerships with local organizations in historically underrepresented communities and neighborhoods with future wind turbine port facilities such as Sunset Park and Rossville. Community based organizations, especially those with workforce development mandates, can share Offshore Wind opportunities within their local networks. For fields such as construction and electrical, unions and trade organizations may conduct wider recruitment efforts for worker candidates in the Bronx and Queens. Similarly, these union and trade organizations may also work with local community based organizations to conduct targeted outreach on Offshore Wind job opportunities.

In Sunset Park there are several social services organizations that offer broad based workforce development resources and outreach, such as Uprose, Brooklyn Workforce Innovations, and Fifth Avenue Committee. Likewise, the Rossville community on Staten Island is serviced by a number of local organizations, including the Staten Island Economic Development Corporation and United Activities Unlimited.

1C: Advertise the sector through water safety and swimming programs

Swimming and water safety skills are essential to preparing a safer Offshore Wind talent pipeline. Employers may help build awareness of the Offshore Wind sector through community programs that provide access to aquatic skills and exposure to maritime environments. Program operators and employers should consider sponsorship and outreach opportunities in aquatic facilities and maritime ports that provide classes and after-school programs on basic water safety and swimming instruction.

1C: Program Examples

YMCA of Greater New York. Community Offshore Wind, a joint venture between RWE Renewables and National Grid, is partnering with the YMCA of Greater New York and YMCA of Long Island to make swimming lessons accessible to children in need of financial assistance. Funding from Community Offshore Wind will help offset the cost of swim lessons for over 100 children across Long Island and New York City with lifesaving water safety skills through the YMCA.

SUNY Maritime College. SUNY Maritime offers a number of parent-child swimming programs and maritime skills training that are open to the general public. In addition, SUNY Maritime has hosted after-school and summer programs for middle-school and high-school students that introduce waterfront activities in combination with STEM learning.





OFFSHORE WIND STRATEGY #2:

Expand multi-disciplinary training capacity through coursework and apprenticeships

To meet upcoming Offshore Wind workforce needs, public and private entities must scale up job training and placement programs including apprenticeships. CUNY and SUNY campuses are establishing Global Wind Organization (GWO)¹ training facilities to attract individuals with related skill sets (electrical, plumbing, welding, construction, engineering). Since much of the construction and electrical work involved will be covered by unions, registered apprenticeships will be key in training new workers for Offshore Wind occupations. Unions may be able to provide apprenticeship programs, pre-apprenticeships, and direct entry programs that prepare candidates for work in Offshore Wind construction trades.

2A: Support training and micro-credential development at colleges and Global Wind Organization (GWO) partners

Specialized Offshore Wind curricula and relevant programs are being developed at CUNY and SUNY campuses. Training providers should coordinate with NYSERDA and Offshore Wind employers to ensure that skills and competencies align with worker needs. Employer feedback is needed in order to advance SUNY and CUNY campuses' GWO certifications and the development of Basic Safety Training programs. Skills and competencies may include operations, maintenance, wind turbine technology, electrical, and basic safety.

In addition, micro-credentials for Offshore Wind have the potential to prepare individuals for an eventual GWO certification. The GWO has multiple certifications and skills areas that correspond with a variety of career pathways. Some skills appropriate for micro-credential certifications include safety training, first aid, wind turbine operations, and wind turbine maintenance.

¹ The GWO is a non-profit body founded by wind turbine manufacturers and owners and is charged with establishing common international standards for safety training and emergency procedures.

2A: Program Examples

Farmingdale State College. Farmingdale State College, a SUNY school located on Long Island, has established a Wind Energy Technology micro-credential which prepares participants for technical careers in wind energy-related fields. Program participants engage in hands-on learning through the use of trainers and virtual reality simulations. Credits earned from the Wind Energy Technology microcredential may be applied toward the Farmingdale State College Wind Turbine Technology Certificate.

Kingsborough Community College. Kingsborough Community College is laying the groundwork to become a GWO certified Basic Safety Training facility that can respond to the workforce demands and the long-term needs of the Offshore Wind industry. Created in partnership with AIS Survivex, the new curriculum includes a globally recognized industry-informed credential that helps students learn basic safety procedures for the Offshore Wind industry. Training for students will include working at heights, sea survival, fire awareness, and manual handling.

SUNY Maritime College. SUNY Maritime College's Center of Excellence for Offshore Renewable Energy offers classroom and online training programs for wind operations, dynamic positioning, and offshore vessel operations. The center serves as a research resource for offshore renewable energy participants. It is seeking to offer GWO training and create mock wind turbines and two maritime simulators.

2B: Work with industry partners to establish and expand job training through apprenticeship programs

A number of in-demand occupations in the Offshore Wind sector require apprenticeship for entry-level positions: electricians, operators, welding / metal work, marine services, and construction positions. Unions and trades organizations may provide specific job entry training, individual mentorship, and full-time employment. In addition, unions and Offshore Wind developers should conduct targeted outreach to underrepresented communities to connect with females, minorities, and veterans, encouraging applications for potential apprenticeship opportunities.

Private sector actors should also improve diversity in the sector - particularly if the REDC and State recognize these entities as achieving excellence in this area. Employers and labor organizations should engage NYCDOE, CUNY and SUNY on opportunities to conduct student outreach, provide online resources, and conduct onsite information sessions. Employers may also explore if there are opportunities to incorporate Career Readiness and Modern Youth Apprenticeship (CRMYA) participation.

2B: Program Example

International Brotherhood of Electrical Workers (IBEW) Local 3. IBEW Local 3 has made an effort to attract apprentices and new electricians to the Offshore Wind sector. In the past year, IBEW Local 3 coordinated recruitment sessions for Offshore Wind at the union's apprenticeship training facility in Queens. These recruitment sessions were coordinated with partner organizations Climate Jobs New York, Cornell University, and the International Union of Operating Engineers (IUOE) Local 30.





OFFSHORE WIND STRATEGY #3:

Enhance recruitment and upskilling of workers in adjacent fields to meet hiring demand

The recruitment and upskilling of students / workers in the maritime, manufacturing, construction, and electrical industries is essential to meet expected demand in the construction, installation, and operations of Offshore Wind infrastructure. Those transitioning from construction and manufacturing work may need additional training and skills for work on new Offshore Wind projects. As workers transition to this sector, wraparound services that adequately respond to the unique features of Offshore Wind employment schedules and travel are needed. As Offshore Wind employees may spend two-weeks on-site at a time, support in the form of wraparound services is crucial to career success.

3A: Coordinate with unions, trades, and professional industry organizations on outreach and upskilling for the existing workforce

Maritime workers and electricians possess several transferable skills and may have a more seamless ability to upskill or retrain for positions in the Offshore Wind industry. Construction and manufacturing talent will be needed to build new Offshore Wind infrastructure. Unions, trades, and professional industry organizations may facilitate outreach into the potential pipeline of prospective transitioning employees. Potential job opportunities can be communicated through direct marketing exercises and on-site information sessions.

In addition, there is a need to develop on-the-job training programs in partnership with providers and/or various unions (e.g. IBEW Local 3) to support upskilling transitioning workers to fill Offshore Wind positions. Although community college partners are in the process of developing programs, stakeholders expressed a need for more resources for skills training that could be integrated into current apprenticeship models or on-the-job training. Accelerating training program timing or increasing on-the-job training is crucial for aligning the local workforce with these roles and bridging the most critical gaps.

3B: Provide ongoing mentorship and programming support for transitioning workers

A dedicated mentorship program for Offshore Wind careers would assist workers with pathways to upskill or transition into the sector. A dedicated mentor will provide individual and/or professional guidance for a transitioning worker to keep them engaged and determine specific training pathways. The mentor would provide ongoing support from the desire to upskill or transition through successful placement into a new role.

3B: Program Example

Bridge to Offshore. LaGuardia Community College and Kingsborough Community College have created a Bridge to Offshore Wind Program that will provide participants with the opportunity to explore Offshore Wind career pathways and the education and training requirements to enter the industry. The program will focus on preparing students for careers in maritime, electrical, construction and supply chain subsectors.

3C: Integrate wraparound services that adequately respond to the unique features of Offshore Wind employment schedules and travel

As Offshore Wind employees may spend two weeks on-site at a time, support in the form of wraparound services is crucial to career success. Wraparound services, even though readily available, may be challenging for individuals to coordinate. As the Offshore Wind industry sector will scale-up rapidly over the next few years, employers and training providers should begin to identify a single point of contact to facilitate the possible bundling of funding opportunities into comprehensive services for individual trainees and workers.

The City and State offer many different types of support, from funds for travel to help with childcare. Programs like the Child Care Assistance Program provide funds to pay for some if not all the participants' childcare needs. In addition, Fair Fares NYC and Commuter Benefits as well as other workforce organization subsidies provide transportation cost subsidies for city residents. Unions may be able to offer salary compensation for time taken off work for certification training.

“
As we work to
advance our nation-
leading climate
goals and create
the jobs of the
future, offshore
wind projects will
be critical to deliver
clean energy to all
New Yorkers.

”

New York State
Governor Kathy Hochul

Appendices

APPENDIX A. REGIONAL DEMOGRAPHICS AND LABOR MARKET BACKGROUND

A1. REGIONAL BACKGROUND

BJH provided a demographic and labor market analysis as an extension of prior work completed by the New York City Regional Economic Development Council (REDC). In July 2022, the REDCs and ESD support teams undertook an analysis of New York State Department of Labor (NYSDOL) employment data and other industry and occupational data. The initial research resulted in a Regional Workforce Inventory report that assessed New York City's post-pandemic workforce as well as industry labor needs.

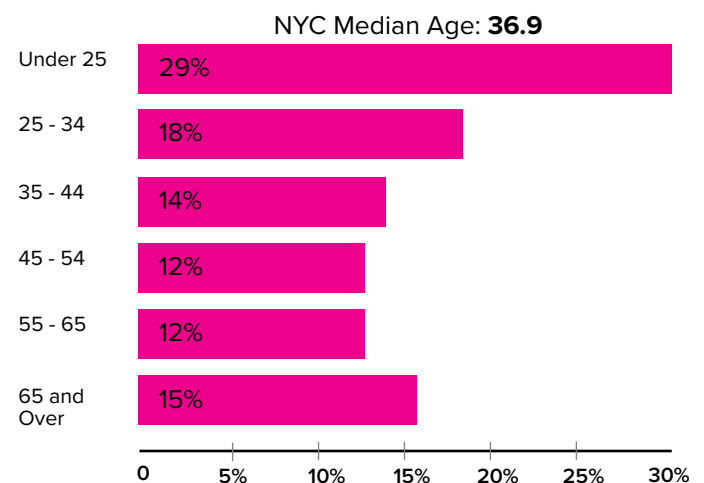
This Appendix provides a supplemental assessment of New York City's¹ demographics and labor markets to confirm the highest priority regional tradable sectors for the REDC. Unless otherwise noted, the report analyzes industry sectors using datasets from Lightcast² – a labor market data provider.

The analysis assessed labor force, age distribution, median area income, educational attainment, industry trends, largest occupations. Below is a summary of key findings.

Key Findings

- As of the 2020 US Census, New York City has a population of approximately 8.8 million, having grown 8 percent over the past 10 years.
- Approximately 41 percent of New York City's population identifies as white, which is less than New York State as a whole (62 percent).
- About 44 percent of New York City's population is aged 25-54, the prime working age bracket, compared to 40 percent in New York State as a whole.

FIGURE 1. NEW YORK CITY POPULATION BY AGE, 2020



Source: US Census Bureau, 2020; American Community Survey, 2020.

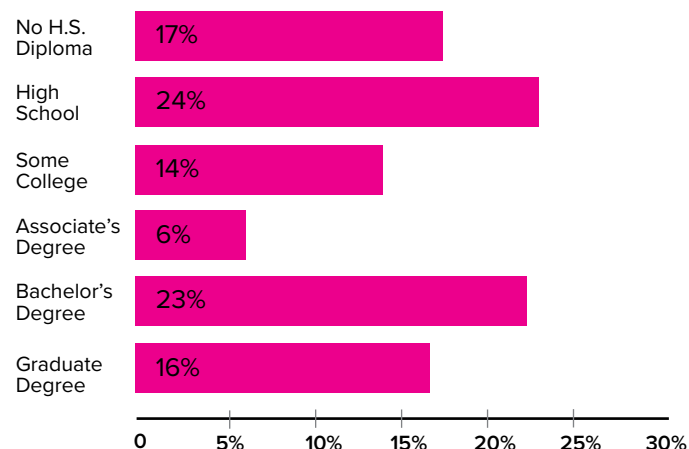
¹ New York City includes five borough-counties: Brooklyn (Kings), Queens, Manhattan (New York), Bronx, and Staten Island (Richmond).

² Lightcast aggregates data from a number of government sources including U.S. Department of Labor (USDOL) and New York State Department of Labor's (NYSDOL) Quarterly Census of Employment and Wages (QCEW), Bureau of Labor Statistics (BLS) research, the U.S. Census, the Equal Employment Opportunity Commission (EEOC) and additional employment and earnings statistics, including job posting analytics.



- Household median income in New York City is \$67,046, compared to \$71,120 in New York state as a whole. Within New York City, this ranges from the Bronx's household median income of \$41,895 to Manhattan's household median income of \$89,812.
- 39 percent of New York City's population 25 years or older has a bachelor's degree or higher, compared to 37.4 percent for New York State as a whole; however, this ranges widely from county to county, with 62 percent in Manhattan, 39 percent in Brooklyn, 35 percent in Staten Island, 33 percent in Queens, and 20 percent in The Bronx. The Bronx, Queens, and Staten Island are below the statewide median of 38 percent as well.
- Total private employment in New York City is approximately 4.0 million jobs as of December 2022. New York City had a Gross Domestic Product of approximately \$1.0 trillion as of December 2022. Unemployment is slowly re-turning to pre-COVID-19 pandemic levels at 5.9 percent New York City-wide (as of December 2020) compared to 4.0 percent in 2019. Unemployment reached a peak of 21.0 percent in April 2020. November 2022 unemployment rates in New York City's five boroughs ranged from 4.2 percent in Manhattan to 7.4 percent in the Bronx.

FIGURE 2. NEW YORK CITY POPULATION BY EDUCATIONAL ATTAINMENT, 2020



Source: US Census Bureau, 2020; American Community Survey, 2020.

A2. TRADABLE SECTOR ANALYSIS

Based on the Regional Workforce Inventory conducted by the NYC REDC and ESD, the NYC REDC selected the following tradable sectors⁵ for analysis: Business Services, Financial Services, Tourism, Life Sciences, Technology and Offshore Wind. BJH and Workforce Opportunity Services (WOS) evaluated additional labor and economic trends within these tradable industry sectors for New York City. Video and Music Production, and Cannabis were also selected for analysis based on the working group's feedback.

BJH and WOS assessed trends in each tradable sector, including total jobs, employment growth over the past ten years, projected growth over the next ten years, average earnings, job location quotient analysis, and shift share analysis. The assessment also examined racial and gender diversity of the workforce in each sector. Table A represents an overview of the consultant team's industry sector analysis.

Key Findings

- In New York City, the average earnings (including wages, salaries, and benefits) for all industry sectors were \$113,723.
- Financial Services has the highest average annual total earnings (including wages, salaries, and benefits) of all the tradable sectors, followed by Technology, Business Services, and Life Sciences. Offshore Wind also has high annual average earnings at approximately \$136,850 per year. Tourism (\$98,679) and Cannabis (\$55,705) had the lowest average earnings.
- Of the analyzed tradable sectors in New York City, Business Services was followed by Financial Services as having the largest total employment at 269,242 and 211,378, respectively. The Technology sector is the third largest sector with 190,916 jobs.
- Of the analyzed tradable sectors, Technology has seen the largest growth with an 81 percent increase over the past decade. Cannabis and Life Sciences have also experienced notable growth, at 46 and 37 percent, respectively. Other selected sectors experienced growth ranging from ten percent in Offshore Wind to 32 percent in Video and Music Production. Tourism (-29 percent) and Financial Services'

DEFINITIONS

Tradable Sector³

Based on methodology from Harvard Business School and Lightcast, NAICS sectors are sorted into tradable sectors (or "tradable clusters") and local sectors. Tradable sectors are groups of related industries that serve markets beyond the region in which they are located and tend to export goods and services both nationally and internationally. Tradable clusters include activities such as manufacturing and professional services. Using this methodology, local sectors are defined as those industries that primarily serve the domestic region including health care and education.

Location Quotient

A location quotient is a measure of growth and concentration in the region as compared to nationally. Location quotient is calculated by comparing an industry's or an occupation's share of regional employment with its share of national employment. Industries with a high location quotient are typically (but not always) export industries, which are important because they bring money into the region, rather than circulating local dollars around the economy (which is more typical for retail or restaurants).

Shift Share Analysis

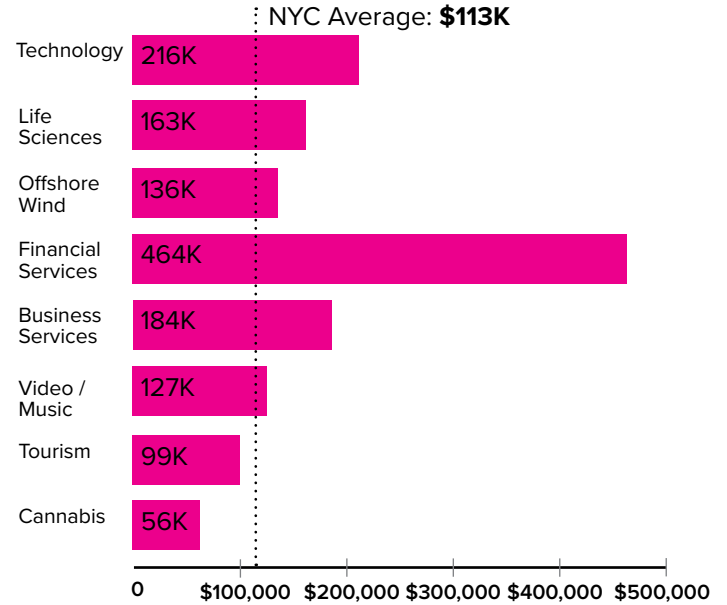
A shift share analysis is a measure of how job growth in a sector can be attributed to national growth trends versus regional specialization and competitiveness. A shift share analysis is similar to location quotient in that it highlights the uniqueness of a regional economy, but it does so in terms of job growth rather than total jobs in an industry. Industries with high regional competitiveness effects highlight the region's competitive advantages or disadvantages

³ Based on methodology from Harvard Business School and Lightcast, NAICS sectors are sorted into tradable sectors (or "tradable clusters") and local sectors. Tradable sectors are groups of related industries that serve markets beyond the region in which they are located. According to the US Cluster Mapping Project, traded sectors are "...free to choose their location of operation and are highly concentrated in a few regions, tending to only appear in regions that afford specific competitive advantages. Since traded sectors compete in cross-regional markets, they are exposed to competition from other regions."

(-2 percent) experienced declines in growth/ job count, mostly due to COVID-19.

- The largest projected job growth (2021-31) for the selected tradable sectors are expected to be within Video and Music Production (+38 percent), Technology (+28 percent), and Life Sciences (+22 percent). While Offshore Wind represents a relatively nascent industry and small number of jobs, it is also projected to see strong growth in the next ten years (+10 percent) and the impacts of planned projects are yet to be fully understood.
- The location quotient analysis shows that, compared to the national average, the highest regional concentration of jobs occurred within Video and Music Production (4.58 times the national average) and Financial Services (3.95 times the national average).
- Shift share analysis is an estimate of regional job growth (or decline) that can be attributed

FIGURE 3. TOTAL EMPLOYEE EARNINGS BY SECTOR, 2021



Source: Lightcast

Note: Total Employee Earnings includes wages, salary, and benefits.

TABLE 1. SUMMARY OF TRADABLE SECTOR METRICS

SECTOR	Jobs and Earnings				Competition and Concentration		Diversity and Entry to Sector			
	Total Jobs, 2021	% Change in Jobs, 2011-21	% Change in Jobs, 2021-	Average Total Earnings, 2021	Location Quotient, 2021	Shift Share, 2021	% Minority, 2021	% Women, 2021	New Hires, 2021	Typical Edu. Req.
All Industries	4,060,731	11%	8%	\$113,723	2.27	(69,966)	53.8%	51.6%	2,700,664	-
Life Sciences	18,225	37%	41%	\$163,301	0.61	1,253	54.1%	57.5%	12,030	Bach. Deg.
Technology	190,916	81%	28%	\$215,903	2.32	27,684	42.7%	39.9%	94,626	Bach. Deg.
Offshore Wind	13,066	10%	10%	\$136,850	1.72	277	49.7%	21.4%	2,044	HS. Dip.
Financial Services	211,378	-2%	4%	\$464,472	6.20	(23,582)	38.2%	38.0%	79,628	Bach. Deg.
Business Services	269,242	27%	6%	\$184,184	1.27	(9,963)	46.4%	46.2%	169,880	Bach. Deg.
Video / Music Production	47,736	32%	38%	\$127,208	6.06	4,237	31.6%	41.2%	94,937	Bach. Deg.
Tourism	53,190	-29%	-13%	\$98,679	1.66	13,202	58.7%	46.6%	67,048	HS. Dip.
Cannabis	14,326	46%	6%	\$55,705	1.11	(5,041)	64.8%	32.6%	15,745	HS. Dip.

to national trends and unique regional factors. As of 2021, Technology exceeded expected estimated job growth by 27,684 jobs. Similarly, there may be competitive effects stemming from Life Sciences (+1,253) and Offshore Wind as well (+277).

- Life Sciences, followed by Business Services and Tourism, had the largest percentage of racial and ethnic minority workers. Video and Music Production and Offshore Wind had the smallest proportion of minority workers.
- Offshore Wind, Cannabis, and Technology had the lowest percentage of women in the workforce among the tradable sectors. Life Sciences had the highest rate of women participation, and was the only sector where women were the majority.
- Of the tradable sectors analyzed, jobs in Tourism, Cannabis, and Offshore Wind typically do not require a Bachelor's degree.

The NYC REDC has recommended the following tradable sectors for further analysis: (1) Technology, (2) Life Sciences, and (3) Offshore Wind. The NYC REDC will continue to monitor tradable sectors that were not selected for additional study at this time. The NYC REDC will assess future priorities and programs given their strengths and opportunities within the region.

A3. SECTOR PRIORITIZATION

The analysis assesses New York City's current employment, tradable industry sectors, and in-demand occupations. Labor datasets are generally organized according to classification systems that correspond with industries, as defined by the North American Industry Classification System (NAICS), or occupations, as defined by the Standard Occupational Code (SOC) system. The data obtained from Lightcast conducts an evaluation of industry sectors and occupations including:

- Full-time versus part-time and contractor positions
- Employee earnings including wages, salaries and benefits
- Skill requirements
- Educational requirements for job posting
- Diversity, specifically race and gender

Based on the previous Regional Workforce Inventory, and the supplemental tradable sector analysis of this Report, the New York City REDC selected three employment sectors as priorities for workforce investment. These sectors are as follows:



TECHNOLOGY



**LIFE
SCIENCES**



**OFFSHORE
WIND**

TABLE 2. SUMMARY OF TRADABLE SECTORS

SECTOR	ANALYSIS METRICS	OCCUPATION REQUIREMENTS	CITY AND REGIONAL WORKFORCE INITIATIVES EXAMPLES	REDC AND STATE ALIGNMENT
Technology	High growth in past decade and high growth potential through 2032. High average wage at \$215,903. Lower in concentration and diversity.	Most jobs require a Bachelor's degree or higher. However, there are a number high-skilled and high-wage opportunities for non-college graduates.	NYC Tech Talent Pipeline CUNY 2x, Inclusive Economy Initiative, CUNY Upskilling Target sector in Mayor's Blueprint for New York City's Economic Recovery	Highlighted by REDC in the 2022 Progress Report OSWD-identified high-growth target industry
Life Sciences	High growth in past decade and high growth potential through 2032. High average wage at \$163,301. Lower in concentration and competitive factors.	Most jobs require a Bachelor's degree or higher. However, there are a number high-skilled and high-wage opportunities for non-college graduates.	NYCEDC LifeSci NYC Target sector in Mayor's Blueprint for New York City's Economic Recovery	Highlighted by REDC in the 2022 Progress Report OSWD-identified high-growth target industry
Offshore Wind	Steady growth in past decade and steady growth potential through 2032. High average wage at \$136,850. Lower in concentration, competitive factor, and diversity.	Most jobs do not require a college degree. Several open positions are high-skilled and/or high-wage.	NYCEDC Offshore Wind Plan Target sector in Mayor's Blueprint for New York City's Economic Recovery	Highlighted by REDC in the 2022 Progress Report OSWD-identified high-growth target industry
Financial Services	Low growth in past decade and low growth potential through 2032. High average wage at \$464,472 and concentration factor. Lower in competitive factor and diversity.	Most jobs require a Bachelor's degree or higher.	General support via Small Business Services	OSWD-identified high-growth target industry
Business Services	High growth in past decade and low growth potential through 2032. High average wage at \$184,184 and concentration factor. Lower in competitive factor and diversity.	Most jobs require a Bachelor's degree or higher.	General support via Small Business Services	Highlighted by REDC in the 2022 Progress Report

SECTOR	ANALYSIS METRICS	OCCUPATION REQUIREMENTS	CITY AND REGIONAL WORKFORCE INITIATIVES EXAMPLES	REDC AND STATE ALIGNMENT
Video / Music Production	High growth in past decade and high growth potential through 2032. High average wage at \$127,208 and concentration factor. Lower in competitive factor and diversity.	Most jobs require a Bachelor's degree or higher.	Mayor's Office for Media and Entertainment grants including Women's Fund and Training Programs. Target sector in Mayor's Blueprint for New York City's Economic Recovery	OSWD-identified statewide high-growth target industry
Tourism	Low growth in past decade and low growth potential through 2032. average wage at \$98,679. Lower in concentration, competitive factors, and gender diversity.	Most jobs do not require a college degree, however, open positions are not high-skilled or high-wage.	NYC & Company Training Academy and Summer Youth Employment Programs.	OSWD-identified regional target industry
Cannabis	Low growth in past decade and low growth potential through 2032. Low average wage at \$55,705. Lower in concentration, competitive factors, and gender diversity.	Most jobs do not require a college degree, however, open positions are not high-skilled or high-wage.	Equity initiatives via NYC Small Business Services. Creation of NYC Cannabis Office to support business services, job creation, and economic development. Target sector in Mayor's Blueprint for New York City's Economic Recovery	Not yet a REDC or OSWD priority

A4. TECHNOLOGY

Technology is one the largest tradable sectors with over 190,000 employees in New York City. The sector experienced 81 percent growth over the past decade and is projected to see continued growth over the next decade. Average annual earnings for this sector are the second highest among all tradable sectors in New York City, surpassed only by Financial Services. The location quotient (2.32) suggests a high level of concentration in New York City, and job growth is higher than expected due to competitive effects of the region. Most jobs require a Bachelor's degree, but opportunities for workers with a high school diploma exist, including computer user support, customer service, and data analyst positions. Employment diversity in this sector falls below the New York City average for both percentage of racial and ethnic minority workers and women workers.



TABLE 3. LARGEST TECHNOLOGY OCCUPATIONS IN NEW YORK CITY, 2021

Occupations	Total Jobs, 2021	% Change in Jobs, 2011-21	% of Industry Sector	Average Hourly Wage, 2021	Typical Education Level	Typical Experience Required	Typical On-the-Job Training
Software Developers	27,924	174%	14.6%	\$69.28	Bachelor's degree	None	None
Sales Reps of Services	11,320	186%	5.9%	\$36.99	High school diploma	None	Moderate-term on-the-job
Market Research Analysts	8,361	440%	4.4%	\$41.61	Bachelor's degree	None	None
Computer User Support Specialists	7,300	55%	3.8%	\$32.20	Some college, no degree	None	None
General and Operations	6,924	143%	3.6%	\$66.80	Bachelor's degree	5 years or more	None
Computer and Information Systems	6,892	98%	3.6%	\$105.63	Bachelor's degree	5 years or more	None
Customer Service Representatives	6,241	38%	3.3%	\$22.42	High school diploma	None	Short-term on-the-job
Project Management Specialists	5,544	521%	2.9%	\$52.81	Bachelor's degree	None	None
Computer Systems Analysts	3,959	(32%)	2.1%	\$55.46	Bachelor's degree	None	None
Management Analysts	3,626	101%	1.9%	\$53.86	Bachelor's degree	Less than 5 years	None

A5. LIFE SCIENCES

Life Sciences is a fast-growing sector, having increased in number of jobs by 36 percent over the past decade, with projected growth of 22 percent over the next decade. New York City is home to several incubators and early-stage companies that will expand in the coming years. Average earnings in the Life Sciences sector are amongst some of the highest of all tradable sectors in New York City. Most jobs in the sector require Bachelor's degrees. This is particularly true for early-stage Life Sciences companies, where there are few opportunities for workers with only high school diplomas. However, Life Sciences companies need data analysts, lab technicians, medical technicians, phlebotomists, sales representatives, and administrative staff—roles that do not necessarily require advanced degrees. Employment in this sector is particularly diverse with 51 percent minorities and 59 percent women.



TABLE 4. LARGEST LIFE SCIENCES OCCUPATIONS IN NEW YORK CITY, 2021

Occupations	Total Jobs, 2021	% Change in Jobs, 2011-21	% of Industry Sector	Average Hourly Wage, 2021	Typical Education Level	Typical Experience Required	Typical On-the-Job Training
Clinical Laboratory Technologists	919	105%	6.1%	\$38.84	Bachelor's degree	None	None
Medical Scientists, Except Epidemiologists	568	(26%)	3.8%	\$47.12	Doctoral or professional degree	None	None
Software Developers	553	73%	3.7%	\$69.28	Bachelor's degree	None	None
Phlebotomists	534	178%	3.6%	\$23.23	Post secondary nondegree	None	None
General and Operations	457	84%	3.0%	\$66.80	Bachelor's degree	5 years or more	None
Executive Secretaries	316	3%	2.1%	\$40.93	High school diploma	Less than 5 years	None
Project Management	297	243%	2.0%	\$52.81	Bachelor's degree	None	None
Biological Technicians	276	130%	1.8%	\$28.82	Bachelor's degree	None	None
Couriers and Messengers	266	49%	1.8%	\$19.73	High school diploma	None	Short-term on-the-job
Natural Sciences Managers	251	189%	1.7%	\$81.79	Bachelor's degree	5 years or more	None

A6. OFFSHORE WIND

New York City's burgeoning offshore wind industry is pivotal to the City's clean energy transition and is poised to support rapid employment growth. New York City—already home to 47 percent of the State's offshore wind-related jobs—announced in September 2021 a commitment of \$191 million in offshore wind investments over 15 years.

As a nascent industry, offshore wind is a smaller tradable sector in terms of total jobs. There is, however, potential for job growth. For example, employment has grown ten percent over the past decade, and is expected to grow in the next decade due to the construction and manufacturing of wind farms within New York City and the surrounding regions. While New York City's offshore wind sector does not have a strong

concentration or competitive effect, this may change over the coming years with the expected wind farm expansions. Furthermore, average earnings in the sector are much higher than the average earnings for all private sector jobs in New York City. Most jobs in the sector – such as electricians, installation / maintenance, operations, drafting, maritime support, and customer service – only require a high school diploma. There is also a great opportunity to improve upon diversity outcomes. Employment diversity in this sector falls below New York City's average with 49 percent minorities and only 21 percent women.



TABLE 5. LARGEST OFFSHORE WIND OCCUPATIONS IN NEW YORK CITY, 2021

Occupations	Total Jobs, 2021	% Change in Jobs, 2011-21	% of Industry Sector	Average Hourly Wage, 2021	Typical Education Level	Typical Experience Required	Typical On-the-Job Training
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	946	15%	7.2%	\$42.40	Post Doctoral or professional degree	Less than 5 years	Moderate-term on-the-job training
Electrical Power-Line Installers and Repair	938	(3%)	7.2%	\$50.97	High school diploma or equivalent	None	Long-term on-the-job training
First Line Supervisors of Installers, and Repairers	756	59%	5.8%	\$40.67	High school diploma or equivalent	Less than 5 years	None
Electrical Engineers	640	12%	4.9%	\$51.58	Bachelor's degree	None	None
Customer Service Representatives	594	(12%)	4.5%	\$22.42	High school diploma	None	Short-term on-the-job
Control and Valve Installers and	520	13%	4.0%	\$45.27	High school diploma	None	Moderate-term on-the-job
General and Operations	372	24%	2.8%	\$66.80	Bachelor's degree	5 years or more	None
Power Plant Operators	336	23%	2.6%	\$49.37	High school diploma	None	Long-term on-the-job
Electricians	312	4%	2.4%	\$40.70	High School Diploma	None	Apprenticeship
Production, Planning, and Expediting Clerks	297	491%	2.3%	\$26.83	High School Diploma	None	Moderate-term on-the-job

APPENDIX B. SECTOR DEFINITIONS

The Regional Workforce Inventory analyzed broader target industry sectors based on 2-digit North American Industry Classification System (NAICS) codes. This document assesses tradable sectors. NAICS sectors can be sorted into tradable sectors (or “tradable clusters”) and local sectors. Tradable sectors are groups of related industries that serve markets beyond the region in which they are located. According to the US Cluster Mapping Project, traded sectors are “...free to choose their location of operation and are highly concentrated in a few regions, tending to only appear in regions that afford specific competitive advantages. Since traded sectors compete in cross-regional markets, they are exposed to competition from other regions.”

Tradable sector definitions were derived from the following sources:

- Lightcast
- Prior REDC / ESD Research
- Stakeholder Feedback
- City and State Agency Reports (e.g. NYCEDC, NYSED)

TABLE 6. TECHNOLOGY NAICS

SUB-SECTOR	NAICS CODE
Computer and Peripheral Equipment Manufacturing	3341
Communications Equipment Manufacturing	3342
Audio and Video Equipment Manufacturing	3343
Semiconductor and Other Electronic Component Manufacturing	3344
Navigational, Measuring, Electromedical, and Control Instruments Manufac-	3345
Electronic Shopping and Mail-Order Houses	4541
Software Publishers	5112
Wired and Wireless Telecommunications Carriers	5173
Satellite Telecommunications	5174
Other Telecommunications	5179
Data Processing, Hosting, and Related Services	5182
Other Information Services	5191
Computer Systems Design and Related Services	5415



TABLE 7. LIFE SCIENCES NAICS

SUB-SECTOR	NAICS CODE
Medicinal and Botanical Manufacturing	325411
Pharmaceutical Preparation Manufacturing	325412
In-Vitro Diagnostic Substance Manufacturing	325413
Biological Product (except Diagnostic) Manufacturing	325414
Electromedical and Electrotherapeutic Apparatus Manufacturing	334510
Irradiation Apparatus Manufacturing	334517
Surgical and Medical Instrument Manufacturing	339112
Surgical Appliance and Supplies Manufacturing	339113
Dental Equipment and Supplies Manufacturing	339114
Ophthalmic Goods Manufacturing	339115
Dental Laboratories	339116
Research and Development in Biotechnology (except Nanobiotechnology)	541714
Research and Development in the Physical, Engineering, and Life Sciences	541715
Medical Laboratories	621511
Diagnostic Imaging Centers	621512

**TABLE 8. OFFSHORE WIND NAICS**

SUB-SECTOR	NAICS CODE
Wind Electric Power Generation	221115
Other Electric Power Generation	221118
Electric Bulk Power Transmission and Control	221121
Electric Power Distribution	221122
Power and Communication Line and Related Structures Construction	237130
Prefabricated Metal Building and Component Manufacturing	332311
Industrial Mold Manufacturing	333511
Turbine and Turbine Generator Set Units Manufacturing	333611
Speed Changer, Industrial High-Speed Drive, and Gear Manufacturing	333612
Mechanical Power Transmission Equipment Manufacturing	333613
Motor and Generator Manufacturing	335312
Switchgear and Switchboard Apparatus Manufacturing	335313
Current-Carrying Wiring Device Manufacturing	335931



APPENDIX C. PHOTO CREDITS

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APPENDIX E. ABBREVIATIONS

BLS	Bureau of Labor Statistics
CompTIA	Computer Technology Industry Association
CRMYA	Career Readiness and Modern Youth Apprenticeship
CTE	Career and Technical Education
CUNY	City University of New York
EEOC	Equal Employment Opportunity Commission
ESD	Empire State Development
GWO / BST	Global Wind Organization / Basic Safety Training
IBEW	International Brotherhood of Electrical Workers
NAICS	North American Industry Classification System
NYC	New York City
NYCDOE	New York City Department of Education
NYCEDC	New York City Economic Development Corporation
NYC REDC	New York City Regional Economic Development Council
NYSDOL	New York State Department of Labor
NYSERDA	New York State Energy Research and Development Corporation
OSWD	Office of Strategic Workforce Development
PTA / PTO	Parent Teacher Association / Parent Teacher Organization
QCEW	Quarterly Census of Employment and Wages
REDC	Regional Economic Development Council
STEM	Science, Technology, Engineering and Mathematics
SOC	Standard Occupational Code
SUNY	State University of New York
TTP	Tech Talent Pipeline
USDOL	U.S. Department of Labor
UX/UI	User Experience / User Interface



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