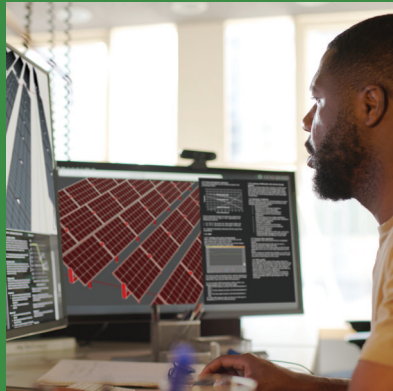


FEBRUARY 2024

GREEN ECONOMY



ACTION PLAN



NYC / EDC



Mayor's Office of
Talent and Workforce
Development

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Letters

**LETTER FROM
DEPUTY MAYOR
MARIA TORRES-SPRINGER**

To my fellow New Yorkers:

Climate change is real. No matter the season, New York City is experiencing the impacts of a warming planet. It is plain to see that more extreme weather events are hitting the city with greater frequency. This is our reality, and the City of New York is confronting the challenges of climate change unlike any city in the world. Look no further than Local Law 97, PlaNYC, PowerUpNYC, the Mayor's Office of Climate and Environmental Justice's study on environmental justice in New York, a new approach to climate budgeting, and the Center for Climate Solutions on Governors Island. The city's response to climate change is yet one more example in our 400-year history of New Yorkers joining together to overcome challenges with ingenuity and emerge stronger each time. The *Green Economy Action Plan* builds on New York City's spirit of resilience and the work underway across city government to offer an integrated economic development agenda and talent strategy. This call to action will help unlock the full potential of New York City's economy and human capital in the urgent work of slowing climate change and creating a more equitable and resilient city.

The action plan contains six new contributions to our understanding of New York City's green economy and a roadmap to reducing carbon emissions and creating a more climate-conscious city:

- The first-ever comprehensive definition of the "Green Economy" in New York City
- A sizing of the Green Economy today and forecasts of growth by 2030 and 2040, by sector and occupation
- A talent strategy to ensure New Yorkers access the jobs of the future
- A set of new programs and policies that will advance the Green Economy
- Clear ways to partner and collaborate with the private sector, universities, nonprofits and others in service of our shared goals
- A call to action for all New Yorkers

Taken together, the *Green Economy Action Plan* will make New York City's economy more competitive and prosperous, will create more family-sustaining jobs and on-ramps for all New Yorkers into those careers, and accelerate the work of making New York City more resilient in the face of climate change. We can, and I believe we will, achieve all three goals at the same time if we adopt a whole-of-society approach, summoning the same spirit that New York City has demonstrated repeatedly to confront big problems throughout our history.

Throughout the action plan one point is clear: government is most effective when we work in partnership. We will lead, but we will not succeed if we act alone. In addition to major investments of public funds, policies and programs, New York City will create the conditions for collaboration, private sector innovation, and equitable growth so that the city's entire ecosystem is involved in the urgent work of building tomorrow's green economy. With that in mind, to our partners across the city and to all New Yorkers, I invite you to take part in this effort because enduring success depends on all of us.



Maria Torres-Springer
Deputy Mayor for Housing, Economic Development and Workforce
NYC Office of the Mayor

LETTER FROM NYCEDC & NYC TALENT

New York City is contending with climate change, straining resources, and higher temperatures and more frequent severe weather events that disproportionately impact our most vulnerable New Yorkers. Tackling the deeply connected and multiple impacts of climate change is one of our city's greatest challenges, but it also creates opportunity. The *Green Economy Action Plan* defines this opportunity, outlining a roadmap to grow the city economy, reduce greenhouse gas emissions, increase resiliency to extreme climate events, and invest in the city's people and economy.

We are at an unprecedented moment for public and private investment in climate action and are excited to position NYC as the epicenter of this global green transition. With this Action Plan, the number of New Yorkers employed in the green economy could more than triple to nearly 400,000, or almost 7 percent of all jobs, and its expected GDP output could nearly triple to \$89 billion annually by 2040. Critical to this growth will be our ability to transition our existing jobs and industries to a climate-conscious future and position New Yorkers, particularly those from economically disadvantaged and environmental justice communities, for emerging career pathways in the green economy.

Our economy changing is inevitable, as new policies, technologies, and consumer preferences will continue to orient toward climate action. What is not inevitable is that our existing jobs and industries will keep pace. NYC's commitments in this Action Plan are critical for ensuring the robust private sector investment and action imperative to ensure that New Yorkers are prepared to make this transition into the green economy and that NYC can attract and grow new green economy businesses.

The *Green Economy Action Plan* seeks to provide not only growth, but also environmental and economic justice. All people, regardless of race, disability, age, or socioeconomic background, have a right to live, work, and play in communities that are safe, healthy, and free of harmful environmental conditions. New York City is committed to both reducing the environmental burden on its environmental justice communities and ensuring that economically disadvantaged New Yorkers contribute to and benefit from the wealth and jobs created through this effort.

Having engaged 100+ actors across industry associations, unions, nonprofits, philanthropic groups, governments, and corporate and community partners, the *Green Economy Action Plan* outlines NYC's commitment to more than 63 actions, identifying a path forward to:

- Decarbonize buildings and construction,
- Develop a renewable energy system,
- Enable low-carbon alternatives in the transportation sector,
- Catalyze business growth, job creation and innovation in climate technologies, and
- Ensure an equitable green economy ecosystem.

These actions will focus on increasing opportunities for minority and women-owned businesses and building robust, accessible pathways to occupations that provide family-sustaining wages for New Yorkers, including many occupations that do not require a college degree. Actions include launching the Harbor Climate Collaborative along the New York

Harbor with an investment of \$725 million from New York City to catalyze climate education, research, innovation, commercialization, and workforce development alongside partners from the private and nonprofit sectors. Another is the Climate Innovation Hub, a \$100 million investment by NYC to develop a world class facility in Sunset Park, Brooklyn, geared toward accelerating commercialization pathways for climate tech startups and incumbent businesses and providing workforce programming to upskill New Yorkers through green training and opportunities.

The *Green Economy Action Plan* is for every New Yorker and community. Whether you're a new climate startup, an existing business thinking about going green, an educator looking to connect your students to a new career, or a New Yorker looking for a well-paying job—if you call NYC home, or want to, you can play a role in shaping a thriving green economy.



Andrew Kimball
President & CEO
NYCEDC



Abby Jo Sigal
Executive Director
NYC Mayor's Office of Talent
and Workforce Development



Executive Summary

Executive Summary

In 2023's *PlaNYC: Getting Sustainability Done*, the City committed to creating a “comprehensive green economy industry action plan” that defines the green economy and lays out NYC's path to seizing the opportunity it presents. This *Green Economy Action Plan*, jointly developed by the New York City Economic Development Corporation (NYCEDC) and the Mayor's Office of Talent and Workforce Development (NYC Talent), delivers on that commitment. It is informed by engagement with more than 100 stakeholders and partners from all parts of the green economy—including businesses, unions, workforce organizations, advocates, New Yorkers already working in the green economy, and government agencies—and original analysis.

The *Green Economy Action Plan* is a crucial step for New York City to become a global green economy leader.

The *Green Economy Action Plan* sets forth the first ever universal understanding of the green economy in New York City and establishes a baseline to understand its growth over time. The green economy promises to grow rapidly and become a core part of the City's overall economy in the coming decades, but it will take a continued and concerted public-private effort to achieve this in a way that serves and uplifts all New Yorkers. This Action Plan details 63 City commitments to catalyze businesses, nonprofits, and everyday New Yorkers to collectively build a sustainable, equitable green economy ecosystem in New York City.

This report provides the City's first-ever definition of the green economy.

Globally, there is no consistent definition of the “green economy,” making it difficult to understand how our progress or current state measures against other global leaders and what growth would mean. This report defines the green economy in New York City

as the set of activities that directly and intentionally contribute to achieving our climate goals, specifically those that have gained traction since the turn of the century. These activities span eight sectors and 21 sub-sectors, some that are directly decarbonizing our city, including energy, buildings, and transportation, and some that are supporting these industries, such as finance, and policy and advocacy. Creating the City's first-ever definition will help ensure we can track our progress against our goals and adjust interventions over time to reach the economic potential laid out in this report.

New York City's green economy can become one of the largest industry and workforce ecosystems over the next decade.

The green economy encompassed ~3 percent of New York City's jobs in 2021 (about the size of the real estate sector today) and has outpaced the growth of the broader New York City economy over the last several years. It is projected to continue growing rapidly: by 2040, the City's green economy is projected to employ nearly 400,000 people—7 percent of all jobs in New York City—and contribute \$89 billion to the City's GDP. This would be roughly a tripling in size over the next two decades and would make total employment in the green economy about the size of tech sector employment today.¹ Approximately 70 percent of this growth is projected to come from the transition of existing occupations like construction managers, financial consultants, and fashion designers into the green economy by incorporating sustainable practices into their everyday work, while 30 percent would be entirely new jobs that do not exist today.

Realizing this opportunity requires investment, innovation, and intentional support of diverse businesses and robust career pathways.

New York City is well positioned to become a global leader in the green economy: it is already a global center

NEW YORK CITY'S GREEN ECONOMY

8

SECTORS

21

SUBSECTORS

POTENTIAL FOR

3X

GROWTH OVER NEXT TWO DECADES, FROM

133,000

JOBS IN 2021
TO NEARLY

400,000

IN 2040

21

FOCUS OCCUPATIONS CRITICAL TO
SUSTAINABLE GROWTH

for economic activity and talent, with leading climate legislation and regulations including the landmark Climate Mobilization Act of 2019, which set forth one of the most aggressive approaches to building decarbonization in the world. In addition, New York is an emerging hub for climate innovation: as of 2022, the NYC metropolitan area is the third largest climate tech ecosystem in the world after the Bay Area and London, with venture capital investments reaching almost \$4 billion in 2021. However, this growth will not happen on its own; and it is also not guaranteed to be equitably distributed. New York City will take action to mobilize, accelerate, and channel private sector action,

attracting and incubating a critical mass of companies in the green economy; helping de-risk new technologies and solutions unleashed by the private sector; and developing robust, diverse talent pipelines. The private and nonprofit sectors must invest, innovate, and evolve to realize the potential of the green economy.

We will need a skilled and diverse workforce to power this growth.

This report identifies 21 “focus occupations” critical to the sustainable growth of the green economy. They include many different kinds of skilled labor up and down the value chain. The 21 focus occupations cover both those that typically don’t require a college degree such as electricians, plumbers, or HVAC mechanics and installers, and those that do require a college degree such as civil or electrical engineers. These occupations provide family-sustaining wages or lead to them, providing pathways to stable and well-paying careers for all New Yorkers. In addition, there are occupations in basic or applied sciences that require advanced science, technology, engineering, and mathematics (STEM) degrees, which are important drivers of the city’s climate innovation ecosystem. The strength of our green economy will rely on robust, diverse talent pipelines for all these occupations.

OUR VISION

New York City has always been a leader in sustainability. We are by far the most densely populated major city in the US with the largest mass transit system in the country. Bolstered by ambitious climate policies, the average New York City household emits one-third less carbon than the typical US household. But in 2024, demonstrating climate leadership cannot just be about our own carbon footprint. New York City is an economic powerhouse that is positioned to have an impact on a global scale. To remain at the vanguard of sustainability and innovation, we must

support a broader green transformation, while ensuring that this massive economic opportunity benefits all New Yorkers—especially communities and neighborhoods that have suffered from historic disparities and environmental injustice.

NEW YORK CITY'S GREEN ECONOMY
WILL HOST NEARLY

400,000 JOBS BY 2040

BECOMING THE ANCHOR OF A PROSPEROUS,
EQUITABLE, AND JUST FUTURE FOR NEW YORKERS.

With unprecedented amounts of public funding available for green initiatives, there is a historic opportunity for the City, nonprofit sector, and private industry to benefit.

New York City commits to 63 actions through 2030 to support the equitable growth of the green economy.

These actions will advance five key goals: Decarbonize buildings and construction; Develop a renewable energy system; Enable low-carbon alternatives in the transportation sector; Catalyze innovation in climate technologies; and Build an equitable green economy ecosystem.

Talent development strategies benefiting New Yorkers and employers from all parts of the city are deeply integrated in our goals and actions. The City will deploy five key tools toward connecting New Yorkers to the 21 focus occupations critical to the success of NYC's green economy: training facilities, networks to promote community hiring, youth pathways to the green economy, skills-based training and apprenticeships, and industry partnerships.

This work builds on new policies, such as the City's Community Hiring legislation, and leverages existing programs, such as our Workforce1 systems, to match New Yorkers with pathways to green economy jobs. Through these efforts, the City will deliver 12,000 green economy apprenticeships, ensure our education systems train young people in the skills that are needed, and support the private sector in the transition to green activities.

Seven marquee City commitments across these strategies—new initiatives that we expect to be key market movers—are highlighted below.

Goal 1: Decarbonize buildings & construction.

The buildings sector makes up almost 50 percent of New York City's green economy today. In addition to various initiatives to support the implementation of Local Law 97ⁱ, the City is committed to using its own capital projects to demonstrate and set new standards for decarbonization technologies in construction.

**MARQUEE INITIATIVE:
Circular Construction Guidelines**

NYCEDC will launch and apply the newly developed Circular Construction Guidelines to all capital projects, starting with SPARC Kips Bay—a nearly 2-million-square-foot, \$1 billion+ first-of-its-kind innovation, jobs, and education center in one of the nation's premier life sciences clusters. By using innovative circular construction methods at public sites within the campus, SPARC Kips Bay will reduce 26,400 tons of carbon emissions—equivalent to emissions from 5,800 cars. This project will act as an important demonstration of and standard for new ways of construction in New York City.

**MARQUEE INITIATIVE:
Community Hiring and Place-Based Workforce Strategies**

NYC Talent will work with City agencies and private partners to launch Community Hiring and Place-Based Workforce Strategies to ensure that the growth in NYC's green economy translates to good jobs for New Yorkers, particularly low-income New Yorkers.

Goal 2: Develop a renewable energy system.

New York City will support the creation of approximately 16,000 net new jobs in the renewable energy sector through both direct investments and enabling of private investments in clean energy infrastructure and workforce.

**MARQUEE INITIATIVE:
Tax incentives for battery storage**

NYCEDC will utilize NYC Industrial Development Agency (IDA) tax incentives to activate 500 Megawatts (MW) of battery storage capacity and support other green economy uses. To date, the IDA has induced 200MW of storage capacity that is

ⁱ Local Law 97 is the centerpiece of New York City's Climate Mobilization Act of 2019 and requires about 50,000 large buildings to cut emissions by 40 percent by 2030 and 100 percent by 2050.

expected to come online in the coming years and generated nearly \$500 million of private sector investment. Unlocking additional storage capacity will ultimately underpin a stronger and more efficient renewable energy sector.

Goal 3: Enable low-carbon alternatives in the transportation sector.

The transportation sector contributes about a quarter of New York City's greenhouse gas (GHG) emissionsⁱⁱ today. Transitioning these activities into the green economy, and growing new green subsectors, will make transportation the third-largest green economy sector by 2040.

MARQUEE INITIATIVE: Public sites for EV charging

NYCEDC is availing two acres of land near JFK airport to create the largest EV charging facility in the city, with 65 public EV chargers, including 12 rapid ones. The facility is currently estimated to charge 1,000 vehicles per year, with potential for growth depending on market demand. The EV chargers are expected to serve all types of vehicles, with a focus on the electric truck market as it matures, and help avoid nearly 78,000 metric tons of carbon dioxide emissions by 2040. The City is committed to continuing to build critical infrastructure to facilitate the adoption of new solutions in the green economy.

Goal 4: Catalyze innovation in climate technologies.

New York City is a burgeoning hub for climate innovation, a critical component in addressing the impacts of climate change and for the continued growth of the green economy. Building on existing efforts such as the creation of the Center for Climate Solutions at Governors Island, the City is making significant investments to help businesses develop, test, pilot, and scale innovations and to further grow and attract the next generation of climate companies and investors in NYC.

MARQUEE INITIATIVE: Harbor Climate Collaborative

Brooklyn Navy Yard Development Corporation (BNYDC), NYCEDC, and the Trust for Governors Island (TGI) are collectively investing \$725 million across the new Harbor Climate Collaborative, a joint effort to build a climate innovation ecosystem in the

New York Harbor connected by NYC Ferry. With six million square feet of space for climate research, innovation, and training—the Harbor Climate Collaborative is coordinating piloting and tenanting opportunities to best serve businesses and entrepreneurs, supporting the creation of 5,000 permanent jobs, educating and training 2,100 students, and generating \$55 billion of economic impact.

MARQUEE INITIATIVE: Climate Innovation Hub

As part of the Collaborative, NYCEDC will invest up to \$100 million to develop a world-class Climate Innovation Hub at the Brooklyn Army Terminal. This new space will accelerate commercialization pathways for climate tech startups and incumbent businesses. It will serve 150 startups over 10 years, creating \$2.6 billion of economic impact and 600 jobs, and provide workforce training, especially for the local Sunset Park community.

Goal 5: Build an equitable green economy ecosystem.

NYC Talent, in partnership with NYCEDC and other City entities, will work closely to develop and expand various partnerships across and within industries, as well as with education and workforce training providers to ensure New York City's supply chain and talent grow in tandem, supporting the growth of and benefiting from the economic opportunities created by the green economy. The City will continue its support of small, medium, and M/W/DBE businesses and develop a diverse and skilled workforce.

MARQUEE INITIATIVE: Green training facilities in every borough

NYC Talent will partner with City agencies and private partners to develop a workforce training facility in every borough. The first pilot site will be a Green Building and Construction Workforce pilot program at Governors Island to train 100+ people/year for the first two years.

Achieving our vision will take intentional action from all parts of our economy. This report highlights the ways in which the City will encourage and accelerate growth of the green economy and lower the barrier of entry for entrepreneurs, businesses, and everyday New Yorkers.

We invite all New Yorkers and organizations to join us in building a globally-leading, inclusive green economy in New York City.

ii Global warming gases in Earth's atmosphere of which the most prevalent is carbon dioxide (CO₂)

TABLE 1: GREEN ECONOMY ACTION PLAN COMMITMENTS

Goal 1. Decarbonize Buildings and Construction	
PROMOTE WIDESPREAD USE OF LOW-EMBODIED CARBON BUILDING MATERIALS	1. Launch and apply NYCEDC's Circular Construction Guidelines 2. Advance the Mass Timber Studio with selected design teams
BOLSTER ENERGY EFFICIENCY INITIATIVES	3. Implement Getting LL97 Done 4. Develop Strategic Energy Master Plan for NYCEDC 5. Procure innovative technologies for building retrofits 6. Facilitate green commercial retrofits through M-CORE 7. Decarbonize NYCHA buildings through Clean Heat for All Challenge 8. Implement Leading the Charge Initiative to electrify schools
BUILD CONNECTIONS BETWEEN INDUSTRY AND TALENT IN CONSTRUCTION	9. Launch and expand green building apprenticeship programs 10. Establish community hiring and place-based workforce connection strategies
PIONEER INDUSTRIAL SUSTAINABILITY AT KEY MANUFACTURING AND FREIGHT HUBS	11. Redevelop wholesale produce market into efficient, modern facility 12. Pilot industrial building decarbonization technology at Brooklyn Navy Yard
DEMONSTRATE BEST PRACTICES IN SUSTAINABLE CONSTRUCTION AND DEVELOPMENT	13. Demonstrate a Net Zero Campus on Governors Island 14. Build a first-of-its-kind electric stadium at Willets Point 15. Mandate cutting-edge certifications
Goal 2. Develop a Renewable Energy System	
BUILD AND FACILITATE INVESTMENTS IN CLEAN ENERGY	16. Position industrial sites for clean energy infrastructure 17. Set nation-leading targets for offshore wind 18. Make capital investments in the growth of offshore wind
EXPAND INSTALLATION OF SOLAR INFRASTRUCTURE	19. Broaden solar on NYCEDC sites 20. Expand 5,000 LMI households to install solar
MAKE NYC AN INDUSTRY HUB FOR CLEAN ENERGY SECTORS	21. Launch and expand energy supply chain apprenticeships 22. Bolster CUNY students entering offshore wind and other green industries
SUPPORT TAX INCENTIVES FOR BATTERY STORAGE AND OTHER GREEN OUTCOMES	23. Mobilize IDA for the advancement of the green economy
Goal 3. Enable Low-Carbon Alternatives in the Transportation Sector	
EXPAND EV CHARGING INFRASTRUCTURE	24. Activate public sites for EV charging 25. Create hubs for infrastructure and innovation at Brooklyn Navy Yard 26. Launch EV operation and technician apprenticeships 27. Electrify all City school buses and stand up maintenance training programs
DECARBONIZE MARITIME AND AIR TRAFFIC	28. Install and mandate use of shore power at all cruise terminals 29. Electrify the Governors Island ferry 30. Spearhead the adoption of electric aircraft at NYC heliports

ENABLE AND RETAIN SUSTAINABLE FREIGHT JOBS AND SERVICES	31. Implement a marine highway for freight transport
	32. Support maritime logistics businesses
	33. Accelerate adoption of cargo bikes
	34. Bolster New York City’s Clean Trucks Program (NYCCTP)
FACILITATE DEMAND FOR PASSENGER MICROMOBILITY	35. Advance SAFEMicromobility for public housing
INDUSTRY EXPOSURE TO SUPPORT WORKFORCE PIPELINES	36. Develop the Building Pathways MTA Electrical Pre-Apprenticeship program

Goal 4. Catalyze Innovation in Climate Technologies

DEVELOP NYC’S HARBOR CLIMATE COLLABORATIVE	37. Activate the Harbor Climate Collaborative
	38. Develop a world-class Climate Innovation Hub at Brooklyn Army Terminal
	39. Complete the 400k SF New York Climate Exchange on Governors Island
ENCOURAGE COMMERCIALIZATION OF GREEN TECHNOLOGY	40. Catalyze sustainability-focused biotechnology and materials innovation
	41. Develop an effective regulatory process to promote climate innovation
	42. Launch Greenlight Innovation Fund
	43. Update outdated land use rules with City of Yes for carbon neutrality

Goal 5. Ensure an Equitable Green Economy Ecosystem

INVEST IN GREEN TALENT	44. Connect young New Yorkers with practical learning and training opportunities in the green economy
	45. Ensure 5-10% of Talent Investment Fund supports green economy workforce development
	46. Enhance Workforce1 Career Centers for the green economy
	47. Provide grants to small businesses for green workforce training
	48. Build Solar One Environmental Education Center
CULTIVATE A LOCAL OFFSHORE WIND SUPPLY CHAIN	49. Provide technical assistance to manufacturers to build a local offshore wind supply chain
	50. Turn West Shore of Staten Island into a hub for clean energy-related jobs
BUILD CONNECTIONS BETWEEN INDUSTRY AND TALENT	51. Establish green training facilities in all five boroughs
	52. Expand and connect industry partnerships to inform green workforce priorities
ADVANCE CRITICAL COASTAL RESILIENCE PROJECTS	53. Advance Lower Manhattan Coastal Resilience Project
	54. Advance the Raise Shorelines Initiative at Travis Avenue and Old Howard Beach
	55. Expand Saw Mill Creek Pilot Wetland Mitigation Bank
	56. Develop Brooklyn Bridge Montgomery Coastal Resilience
	57. Invest in Cloudburst Resiliency Projects
SUPPORT NEW AND TRANSITIONING BUSINESSES ACROSS ALL GREEN ECONOMY SECTORS	58. Invest \$40M to seed the NYC Catalyst Fund
	59. Build capacity and prioritize diverse businesses for City construction
	60. Leverage Waterfront Pathways Program to expand access to green economy opportunities
	61. Establish green loans through the Emerging Developer Loan Fund (EDLF)
	62. Implement the Plant-Powered Carbon Challenge
	63. Establish M/WBE Procurement Opportunities



**NYC's
Green
Economy
Today
and
Tomorrow**

Defining NYC's Green Economy

The term “green economy” is generally used to describe a set of economic activities that are sustainable in nature and/or have emerged in response to climate change. There is no shared global or national definition of the green economy and cities around the world define these economic activities differently. Building from the foundation set in the 2023 PlaNYC, we define the green economy in New York City as the ecosystem of activities that have emerged since the turn of the century that directly and intentionally contribute to achieving our climate goals.ⁱ To enable our city’s progress toward carbon neutrality by 2050, referring to a goal of balancing carbon dioxide released into the atmosphere with action that removes or absorbs it, these activities reduce climate change-inducing greenhouse gas emissions and increase resilience to climate-related hazards such as extreme heat and flooding. While there are many activities that support sustainable outcomes that existed before that time, such as maintaining our parks and developing transit systems, global climate action truly gain traction at the turn of the century. In this report, we focus on activities that have developed over the last two to three decades and have the potential to create enormous economic opportunities for New Yorkers.

NYC’s green economy spans eight sectors and 21 subsectors (see Table 1). These sectors and subsectors consist of many different types of public and

private organizations and workers. Renewable energy, for example, includes the value chain of activities involved in deploying renewable energy systems, from sales to installation and maintenance to transmission and distribution. That means the activities of off-shore wind developers and contractors, for example, as well as those of regulated utilities are included in this subsector.

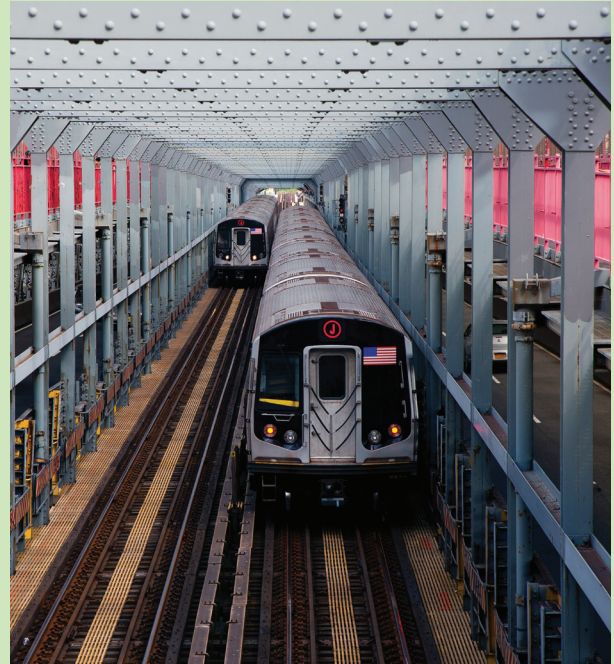
NYC’s green economy includes both:

- **“Net new” activities**, which have only emerged in NYC in the context of the green economy (e.g., deployment of new renewable energy technologies like offshore wind)
- **“Transitioning” activities**, which exist outside the green economy but have evolved to incorporate new and sustainable practices that directly advance decarbonization and resilience (e.g., building construction that incorporates energy efficiency systems)

This first-ever definition of the green economy was informed by NYC’s local economic characteristics, priorities, competitive advantages, extensive stakeholder input, and a review of how other jurisdictions have defined their own green economies. The green economy’s sector composition in NYC may change as the ecosystem continues to expand and evolve. New green sectors and subsectors may emerge as novel technologies such as green hydrogen energy, carbon capture, sustainable chemicals, sustainable aviation fuels, and other climate innovations gain stronger commercial footing. The City will continue to monitor these trends, support these innovations, and update the definition as needed.

ⁱ The United Nations Framework Convention on Climate Change (UNFCCC) was signed in 1992 and committed signatory nations to take action to address global climate change. This laid the foundation for United States climate change policy, and eventually state and local policy as well. In 2007, New York City released the first PlaNYC, which articulated the city’s climate action strategy for the first time. Considering that activities to address climate change gained momentum in New York City between the late 1990s and mid-2000s, this Action Plan uses the turn of the century as a rough marker for the inclusion of activities in our green economy definition.

BUILDING ON A SUSTAINABLE FOUNDATION



NYC subway. Source: Maciej Toporowicz / Getty Images

NYC's average household emissions are one third less than that of the greater United States.² This is largely because of our city's dense urban form and consumption patterns. These associated urban systems, economic activities, and workforces that have long been key to our city's way of life are not counted in this Action Plan's green economy definition because they pre-date climate action, and while they contribute to reducing emissions, they primarily serve other policy goals. They include:

→ **Sustainable transportation:** Public transit (e.g., subways, buses, and ferries) is among the most climate-friendly and equitable transportation modes, and New York City's public transit system is one of the largest in the world. These systems are key to reducing car trips and enabling dense housing, and helping avoid emissions associated with both. It is largely because of this density that NYC is also among the most walkable and least car-dependent cities in the country.³ Notably, NYC's average household transportation emissions are 70 percent lower than the US average.⁴ Tens of thousands of people are employed by the Metropolitan Transportation Authority (MTA) and other agencies and organizations that operate our public transit systems and help make our streets more walkable.

→ **Parks and natural spaces:** NYC's parks and natural areas confer several climate-related benefits, such as storing and sequestering carbon dioxide and other air pollutants and bolstering our city's resilience to flooding and extreme heat events. Thousands of people are employed by the City and the private sector to maintain, protect, and expand these crucial natural areas.

→ **Reuse:** NYC is home to one of the largest, most varied, and most active reuse sectors in the country.⁵ Many NYC households and businesses engage in reuse, defined as the use of a product more than once in its original form or for different purposes. This approach not only extends the lifespan of products and materials, but decreases emissions by reducing the need for production, distribution, and landfilling. Thousands of New Yorkers work in reuse-centered establishments that sell, repair, or rent used appliances and consumer goods (e.g., thrift stores, watch repair stores, or second-hand furniture stores). Notably, NYC has the most thrift stores and flea markets of all large cities across the US.⁶

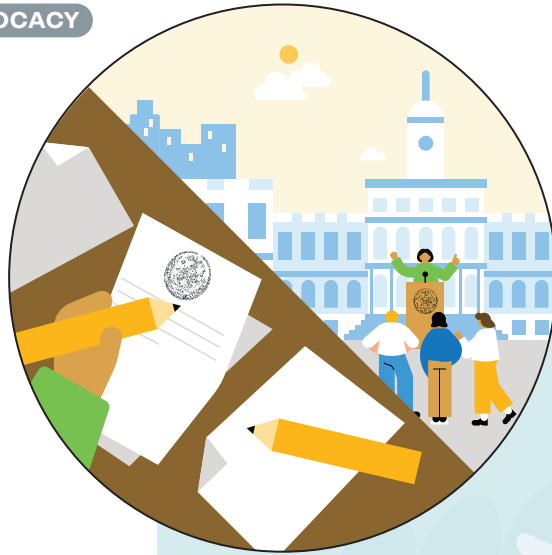
TABLE 2: NEW YORK CITY GREEN ECONOMY SECTORS AND SUBSECTORS

SECTOR	SUBSECTOR	DESCRIPTION	
ENERGY	Renewable energy	Solar	Activities (such as the sales, development, installation, maintenance, and transmission and distribution) involved in deploying these renewable energy technologies. "Other" includes bioenergy and geothermal technologies.
		Offshore wind	
		Onshore wind	
		Hydropower	
		Other	
	Clean fuels	Activities involved in clean energy production using woody biomass, biodiesel, other ethanol and non-woody biomass fuels.	
Smart grid	Activities involved in deploying smart grid (such as digital communications technology to detect and react to local changes in usage) and grid modernization technologies.		
Storage	Activities involved in deploying energy storage technologies (including battery, hydropower, and thermal storage).		
BUILDINGS	Building decarbonization	Activities involved in deploying and maintaining energy-efficient products in buildings (such as efficient HVAC, heating and cooling, insulation, and lighting), retrofitting and electrifying existing buildings and constructing new green buildings, the management and operations of green buildings, and implementing utility energy efficiency programs. ⁱ In addition to helping to reduce emissions, many of these activities also increase resilience to climate hazards.	
	Sustainable building materials	Activities involved in collecting, processing, and deploying recycled building materials, and developing and producing new sustainable building materials.	
TRANSPORTATION	Electric vehicles	Activities involved in the manufacturing, sales, maintenance, and repair of electric and hybrid vehicles, the commercial operations of electric and hybrid vehicles (including in public transit), and the deployment of electric vehicle charging stations.	
	Micromobility	Activities involved in the operations of shared micromobility systems, and the sales, rentals, and maintenance of e-bikes and e-scooters.	
	Green freight and logistics	Activities involved in the operations of high-efficiency and emissions-reduced water, rail, air, and trucking freight and last-mile deliveries.	

ⁱ Green buildings are sustainable or high-performance buildings that efficiently use energy, water, and other resources, and reduce waste, pollution, and environmental degradation.

SECTOR	SUBSECTOR	DESCRIPTION
WASTE	Recycling	Activities involved in glass, paper, metal, plastic, and organics recycling.
CONSUMER PRODUCTS	Sustainable food	Activities involved in the development and operation of crop-producing urban agriculture, circular food systems (such as the upcycling of organics waste), and food science (such as the research, development, and production of alternative proteins, which are meat, egg, or dairy products that are plant-based, cultivated, or fermentation-derived).
	Sustainable fashion	Activities involved in the design, manufacturing, and sales of sustainable apparel, and related materials science (such as the research and development of sustainable textiles and other input materials) and reuse.
FINANCE & CONSULTING	Green finance	Activities involved in the financing of projects and ventures that advance decarbonization and climate resilience (including traditional debt instruments, green bonds, climate-focused venture capital, and other sustainability funds).
	Climate consulting and accounting	Activities involved in the provision of climate consulting and advisory services (such as public and private strategy and planning advisory and carbon footprint analysis and reduction advisory services) and carbon accounting software.
RESILIENCE INFRASTRUCTURE	Coastal adaptation	Activities involved in the design, construction, and maintenance of coastal resilience projects (including both hard and nature-based infrastructure) funded by governments.
	Inland adaptation	Activities involved in the design, construction, and maintenance of inland flooding and extreme heat adaptation projects (including green infrastructure and sewer improvements) and public transit resilience projects.
POLICY & ADVOCACY	Sustainability policy, planning, and advocacy	Activities involved in the development and implementation of climate policy and planning initiatives undertaken by government, and related advocacy activities by nonprofit organizations.

POLICY & ADVOCACY



CONSUMER PRODUCTS



TRANSPORTATION



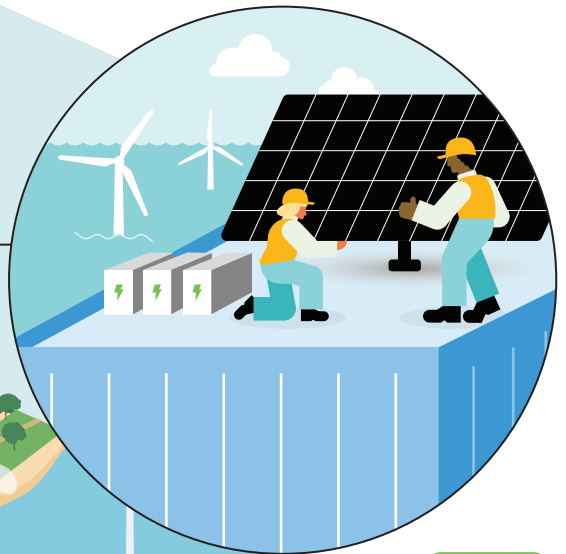
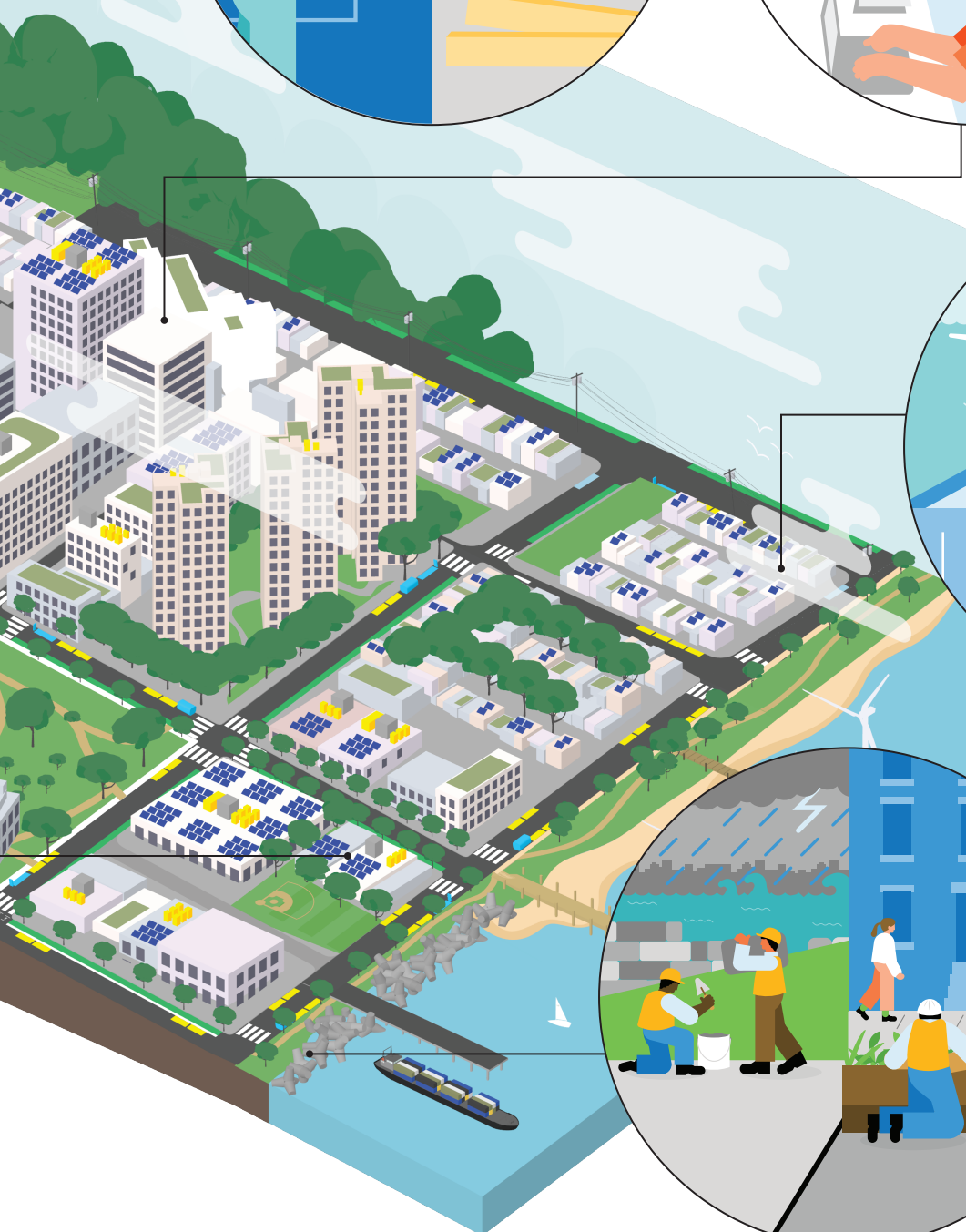
WASTE



BUILDINGS



FINANCE & CONSULTING



ENERGY



RESILIENCE INFRASTRUCTURE

NYC's Green Economy

This study leverages a specially developed methodology that combines traditional and non-traditional methods and data sources. Two sectors, energy and buildings, were quantified using county-level and subsector-specific jobs data from the US Department of Energy and the New York State Energy Research and Development Authority (NYSERDA). Other sectors, for which such specific data is not available, were quantified using a combination of traditional industry and labor market data, calibrated to identify the subset of green economy jobs based on proxies. Bespoke industry datasets created for the purposes of this study relied on sources such as project-level data from NYC government, and establishment-level data from LinkedIn. Individual company websites were also used where existing specific datasets were unavailable. This tailored approach to comprehensively assess green economy jobs in NYC can be refreshed in future years to track growth. See Appendix A for further detail on the methodology used.

For the purposes of this Action Plan, jobs in the green economy include:

- 1. ALL jobs in green companies and organizations whose primary mission directly advances climate goals (e.g., all jobs within a solar company, ranging from a Solar PV installer to HR managers)**
- 2. A SUBSET of jobs in other companies and organizations that directly help advance climate goals (e.g., financial analysts working on renewable energy deals at a traditional bank)**

In 2021, the green economy directly contributed about \$24 billion to NYC's gross domestic product (GDP),ⁱ or 2 percent of the city's total GDP, including about \$16 billion in gross earnings, or 2 percent of citywide earnings, for people who work in the green economy.^{ii, iii}

i GDP is the total monetary value of all final goods and services produced within NYC each year.

ii This report references 2021 data because this is the most recent year that data was available across all sectors at the time of the analysis, which was conducted between November 2022 and October 2023.

iii Gross earnings include wages, salaries, and other types of income.

NYC GREEN ECONOMY IN 2021

133K

JOBS IN NYC GREEN ECONOMY

3%

OF NYC JOBS

\$16B

IN ANNUAL GREEN ECONOMY EARNINGS

2%

OF NYC EARNINGS

\$24B

IN ANNUAL GREEN ECONOMY CONTRIBUTIONS TO NYC GDP

2%

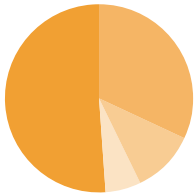
OF NYC GDP

Estimates represent the jobs, earnings, and contributions from the activities listed in Table 2.

FIGURE 1: NYC GREEN ECONOMY JOBS BY SECTOR AND SUBSECTOR (2021)

BUILDINGS

- Building decarbonization 64,900 jobs (48.6%)
- Sustainable building materials 1,300 jobs (1.0%)



Building decarbonization jobs by subcategoryⁱ

- HVAC and renewable heating and cooling 33,200 jobs (51%)
- ENERGY STAR, efficient lighting and reduced water consumption products 20,700 jobs (32%)
- Green building management and operations 7,000 jobs (11%)
- Advancing materials and insulation 3,900 jobs (6%)

TRANSPORTATION

- Electric vehicles 4,800 jobs (3.6%)
- Micromobility 900 jobs (0.7%)
- Green freight and logistics 1,000 jobs (0.8%)

WASTE

- Recycling 3,200 jobs (2.4%)

CONSUMER PRODUCTS

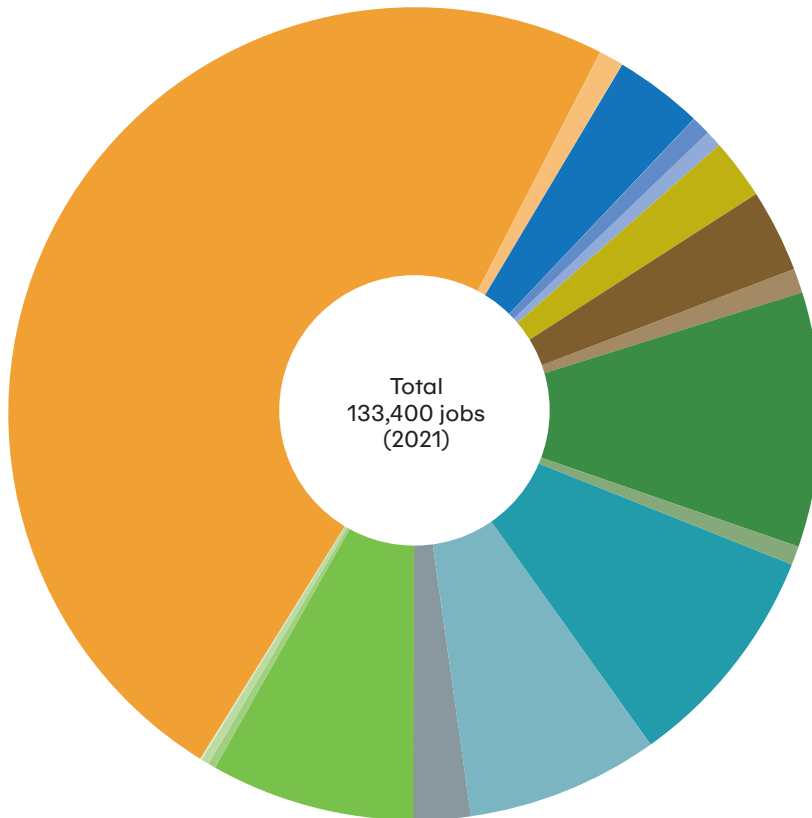
- Sustainable fashion 4,400 jobs (3.3%)
- Sustainable food 1,300 jobs (1.0%)

FINANCE & CONSULTING

- Green finance, 13,500 jobs (10.1%)
- Climate consulting and accounting 1,000 jobs (0.8%)

RESILIENCE INFRASTRUCTURE

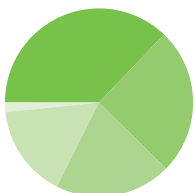
- Coastal adaptation, 12,100 jobs (9%)
- Inland adaptation, 10,200 jobs (7.6%)



Total
133,400 jobs
(2021)

ENERGY

- Renewable energy 10,900 jobs (8.3%)
- Clean fuels 400 jobs (0.3%)
- Storage 400 jobs (0.3%)
- Smart grid 100 jobs (0.1%)



Renewable energy jobs (subsector detail)

- Solar 4,000 jobs (37.1%)
- Other 2,800 jobs (25.1%)
- Hydropower 2,200 jobs (20.1%)
- Onshore wind 1,700 jobs (15.9%)
- Offshore wind 200 jobs (1.7%)

POLICY & ADVOCACY

- Sustainability policy, planning, and advocacy 3,000 jobs (2.2%)

ⁱ These subcategories represent a further breakdown of subsector jobs by activity. Figures do not add up to 64,900 due to rounding.



New Building Construction. Source: Getty Images

Over three-quarters of NYC green economy jobs today are in three sectors:

1. Buildings: This sector employs over 65,000 people, making up nearly half of all green economy jobs in NYC. Its size reflects the vast scale of the city's building stock, which is also the largest source of carbon emissions in NYC, and NYC's nation-leading energy code and building decarbonization policies. Over 80 percent of building decarbonization jobs in 2021 are involved in deploying and maintaining HVAC systems, renewable heating and cooling systems, and energy efficient products and appliances. Many workers in this sector are represented by unions and hold occupations such as electricians, plumbers, HVAC mechanics, carpenters, building managers, stationary, and operating engineers.

2. Resilience infrastructure: This sector employs over 22,000 people, making up almost 17 percent of NYC's green economy jobs. Its size reflects NYC's leadership in advancing ambitious climate adaptation plans and infrastructure projects, much of which has occurred since Hurricane Sandy in 2012. Roughly half of the jobs in this sector focus on coastal adaptation projects (e.g., East Side

Coastal Resiliency) and the other half focus on inland adaptation projects (e.g., green infrastructure installations). Common occupations in this sector include architects, landscape architects, civil engineers, construction laborers, construction supervisors, and surveyors.

3. Finance and consulting: This sector employs over 14,000 people and accounts for about 11 percent of NYC's green economy jobs. Its size reflects the city's role as the world's financial capital and a hub for professional services. Over 90 percent of jobs in this sector are in green finance and the remainder are in climate consulting and accounting. Common occupations in this sector include financial managers, financial or investment analysts, carbon accountants, and sustainability specialists.

It is important to note that the green economy is not a separate sector, but rather encompasses many sectors, businesses and jobs in New York City that exist today. Transitioning activities do not transition "out" of other sectors; they simply join the growing green economy, representing how jobs and business practices will increasingly evolve to intentionally address or mitigate the impacts of climate change.

NYC'S GREEN ECONOMY VS. OTHER PEER CITIES

Defining the Green Economy in Peer Cities

There is no universally accepted definition of the green economy, and it often differs from city to city, making comparisons and benchmarking difficult. Across peer cities, definitions capture a wide spread of activities with a mix of environmental, social, and economic benefits. For instance, Los Angeles defines a green job as being "... either in businesses that directly produce green goods or services or jobs in traditional business directly responsible for making their establishments more environmentally friendly."⁷ The UK government's Green Jobs Taskforce defines green jobs as "employment in an activity that directly contributes to—or indirectly supports—the achievement of the UK's net zero emissions target and other environmental goals, such as nature restoration and mitigation against climate risks."⁸ Both definitions are accompanied by sector-level analyses, however these are based on different approaches. These differences result in variations between jurisdictions as to which green economy activities are measured and how. In fact, the 2021 Los Angeles Cleantech Incubator (LACI) Green Jobs report notes there has been a "... lack of standardized data to measure the green economy ..." and calls for a standard federal definition of the green economy.

Sizing and Growth of the Green Economy among Peer Cities

Comparing the overall size of the green economy across cities is unreliable because definitions differ. Nonetheless, all peer cities' green economies have grown rapidly over time. For example, while New York City's green economy grew by 5 percent annually between 2016–2021, Toronto's green sector grew at 4 percent annually between 2015–2019.⁹ It is notable that both cities grew at double the rate of the rest of the economy.ⁱ Peer cities' green economies are projected to continue

growing rapidly. For example, in LA, green jobs are expected to grow at double the rate of all jobs through 2050.ⁱⁱ

Multiple factors inform what the largest and fastest growing sectors within the green economy are in each city, including city composition, legislation, policy commitments, etc. In London, pressures around energy security and aging infrastructure have led to the power sector holding the largest share of green economy jobs (35 percent or 83,000 jobs).¹⁰ In LA, public spending and policy have spurred growth in clean energy, which comprises about 17 percent of, or 56,100 total, green economy jobs—more than any other subsector.¹¹ New York City has a very large and aging building stock and local legislation has focused on mandates to improve building efficiency, requiring many buildings to be upgraded in the near future. As a result, the greatest share of NYC's green economy jobs are in the buildings sector (about 50 percent of all green economy jobs, or, 66,200 jobs).

Peer City Commitments

Cities around the world are increasingly setting climate goals and making related commitments to grow their green economies. The London Mayor committed to doubling their green economy and has committed GBP 10 million to the Green New Deal to kickstart this effort.¹² Toronto has committed to carbon neutrality by 2040, with multiple intermediary goals (e.g., all new city owned facilities will be near carbon neutral by 2026).¹³ Los Angeles seeks to achieve a 100 percent renewable energy supply by 2045, 100 percent carbon neutral buildings by 2050, and plans to electrify 100 percent of Metro and Los Angeles Department of Transportation (LADOT) buses by 2030.¹⁴ As part of PlaNYC, New York City has committed to carbon neutrality by 2050.¹⁵

i New York City's employment actually shrank in 2021 vs. 2016, but was growing at a rate of 2.2% p.a. between 2016 and 2019 vs. Toronto which was growing at 1.6% p.a. between 2015 and 2019.

ii Estimate based on the growth of overall LA County Green Economy and accounts for anticipated growth in green industries, the transition of some existing jobs to green jobs, and additional jobs created by planned major green investments by the public sector.

Drivers of the Green Economy's Growth

Between 2016 and 2021, employment in the green economy increased by roughly 27,000 jobs, which equates to 5 percent annual growth (see Figure 2).ⁱ This was despite the significant economic disruption caused by the COVID-19 pandemic. By 2021, the city's green economy employed about 133,400 people, amounting to approximately 3 percent of all jobs citywide.

Growth in New York City's green economy has and will continue to be driven by four factors: public policy and targets, government spending and incentives, consumer preferences, and private investment.

1. PUBLIC POLICY AND TARGETS

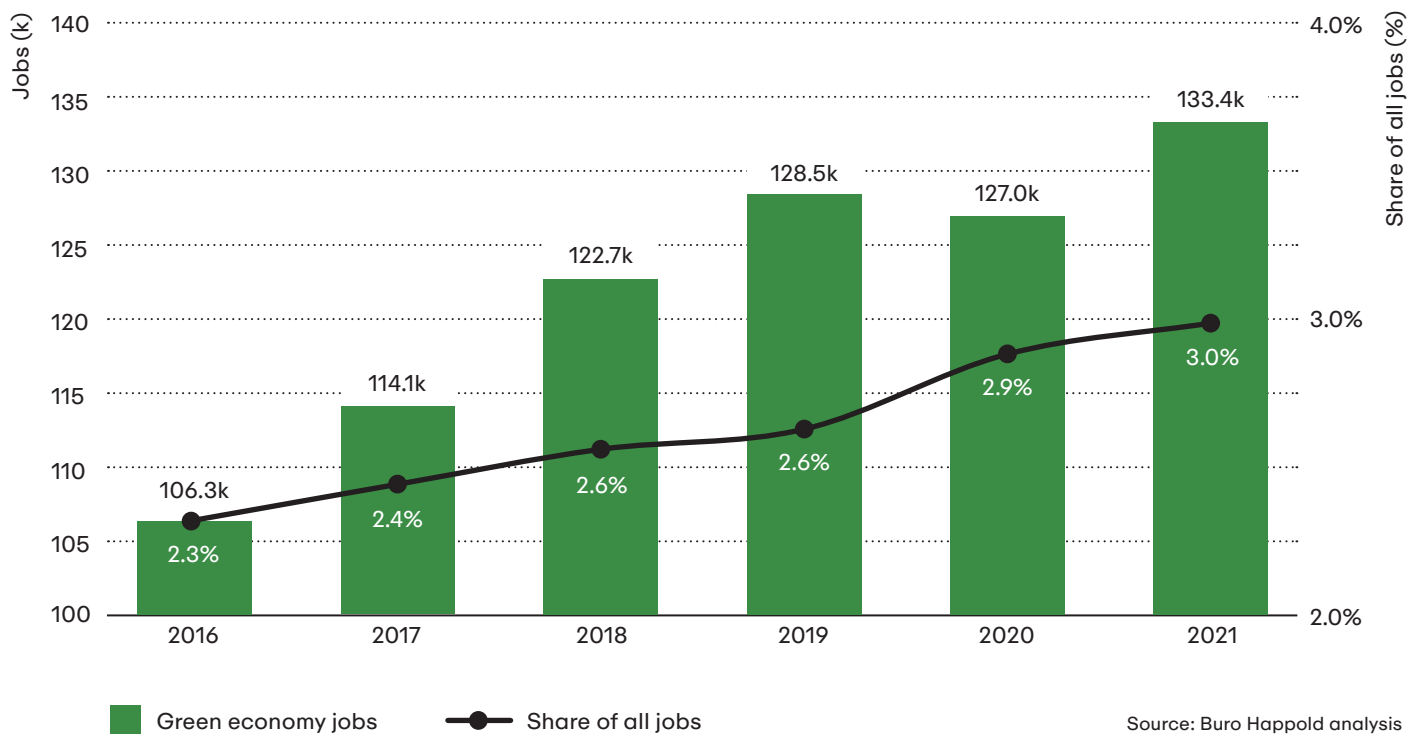
New York City and State have instated some of the world's most ambitious targets and policies, including City and State commitments to 100 percent zero-emission electricity by 2040, and a City commitment to carbon neutrality by 2050. These policies have been essential to establishing the city's large and fast-growing building decarbonization sector for example. NYC's first building emissions policy was announced in 2007 in the original PlaNYC, followed

by several landmark building emissions policies in 2009, including four ground-breaking local laws that comprised the Greener, Greater, Building Plan (see Figure 3). These four local laws included the establishment of an energy code, requirements for building energy auditing and reporting, and mandates for building lighting system upgrades. Subsequent policies have expanded the scope of these local laws and introduced new mandates that cover more buildings and tighten requirements. These and other building emissions policies have accelerated the development of a robust building decarbonization market in NYC. Likewise, NYC's target of 1 GW of solar power by 2030 has helped guide policy and increased investment for solar deployment in the five boroughs.

2. GOVERNMENT SPENDING AND INCENTIVES

Government has also catalyzed growth of the city's green economy by investing billions of dollars in climate action over the last decade. Spending on resilience infrastructure has been one critical focus area for governments in and around the city, with most funding allocated to coastal adaptation projects such as the East Side Coastal Resiliency (ESCR) project and Rockaways-Atlantic Shorefront Resiliency project.

ⁱ This historical analysis is limited to the last five years since this is the period for which high-quality jobs data is available across green economy sectors.

FIGURE 2: NYC GREEN ECONOMY JOB GROWTH 2016–2021

The federal government's unprecedented commitments to spending on climate technology and clean energy have further bolstered the efforts by state and local governments. Over the next 10 years, the federal government will deploy more than \$500 billion on climate technology and clean energy, nationally, as part of three laws: the Infrastructure Investment and Jobs Act (IIJA), the CHIPS and Science Act, and the Inflation Reduction Act (IRA).¹⁶ This is more than triple the average annual US government spending in these areas between 2009 and 2017, and over 15 times more than average annual spending in the 1990s and early 2000s.¹⁷

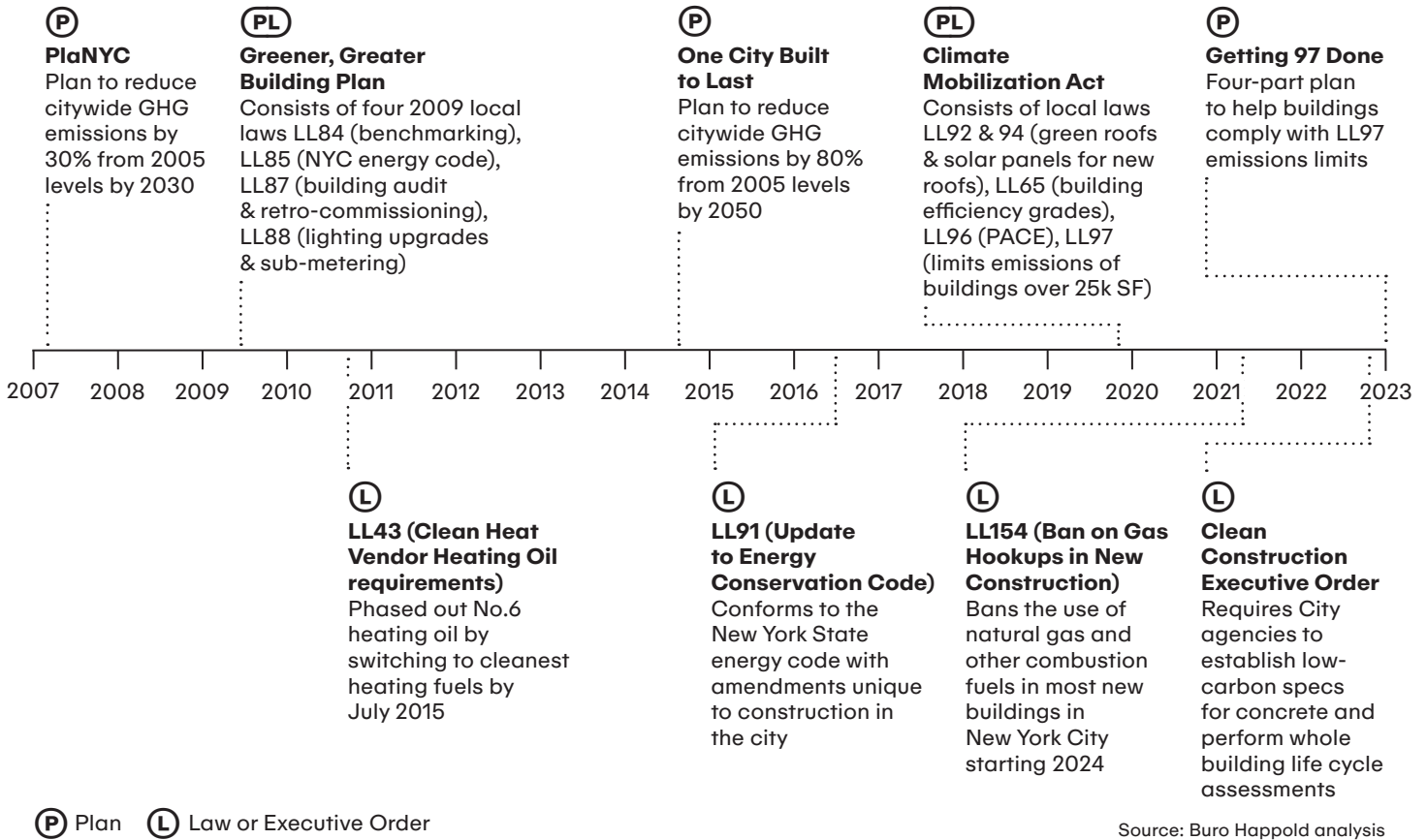
The IIJA and IRA require 40 percent of the overall benefits induced through investments to flow into disadvantaged communities. About half of New York City's census tracts are considered disadvantaged and are therefore expected to see significant investment that enables green growth and helps mitigate historic injustices.^{18 19}

3. CONSUMER PREFERENCES

Growing societal awareness of the climate crisis has begun to shift consumer preferences toward climate-friendly goods and services globally. In the US, sales of consumer products marked as sustainable grew

twice as fast as conventionally packaged consumer goods from 2015 to 2021.²⁰ Demand for green goods and services is expected to continue growing as consumers become increasingly aware of climate impacts and seek to change their purchasing habits. In 2020, a survey conducted by the Capgemini Research Institute of 7,500 consumers globally found that almost 80 percent are changing their purchase preferences based on social and environmental impact.²¹ A 2023 survey conducted by Deloitte of more than 350,000 US customers aged 18 to 98 found that consumers' sustainability demands are rising and that these preferences vary by generation: when Gen Z and Millennial customers believe a brand cares about its impact on people and the planet, they are 27 percent more likely to purchase it than older generations are.²² Changing consumer preferences help create new products, businesses and jobs in the green economy. A clear example is the food sector, where global consumer demand for alternative proteins is expected to surge, potentially becoming a \$290 billion market by 2035 and representing 11 percent of global protein consumption.²³ Shifting consumer preferences toward sustainability may also indirectly drive demand for growth in sectors and subsectors that are critical to decarbonizing business operations, such as renewable energy, building decarbonization, and green freight and logistics.

FIGURE 3: HISTORY OF BUILDING DECARBONIZATION-RELATED POLICIES IN NEW YORK CITY



GETTING 97 DONE

Local Law 97 of 2019, one of the nation’s boldest building decarbonization laws, requires about 50,000 large buildings to cut emissions by 40 percent by 2030 and 100 percent by 2050. A majority (63 percent) of these buildings currently exceed the carbon emissions limits set for 2030. NYC government operations are also subject to LL97, with even stricter emission reduction targets than those for private-sector buildings.

The City is working to spur private investment to meet LL97 targets through enabling specialty lending vehicles like CPACE. Green lenders like the New York Green Bank (NYGB) and the New York City Energy Efficiency Corporation (NYCEEC) are also investing directly to grow the building decarbonization subsector and enable the growth of the subsector.

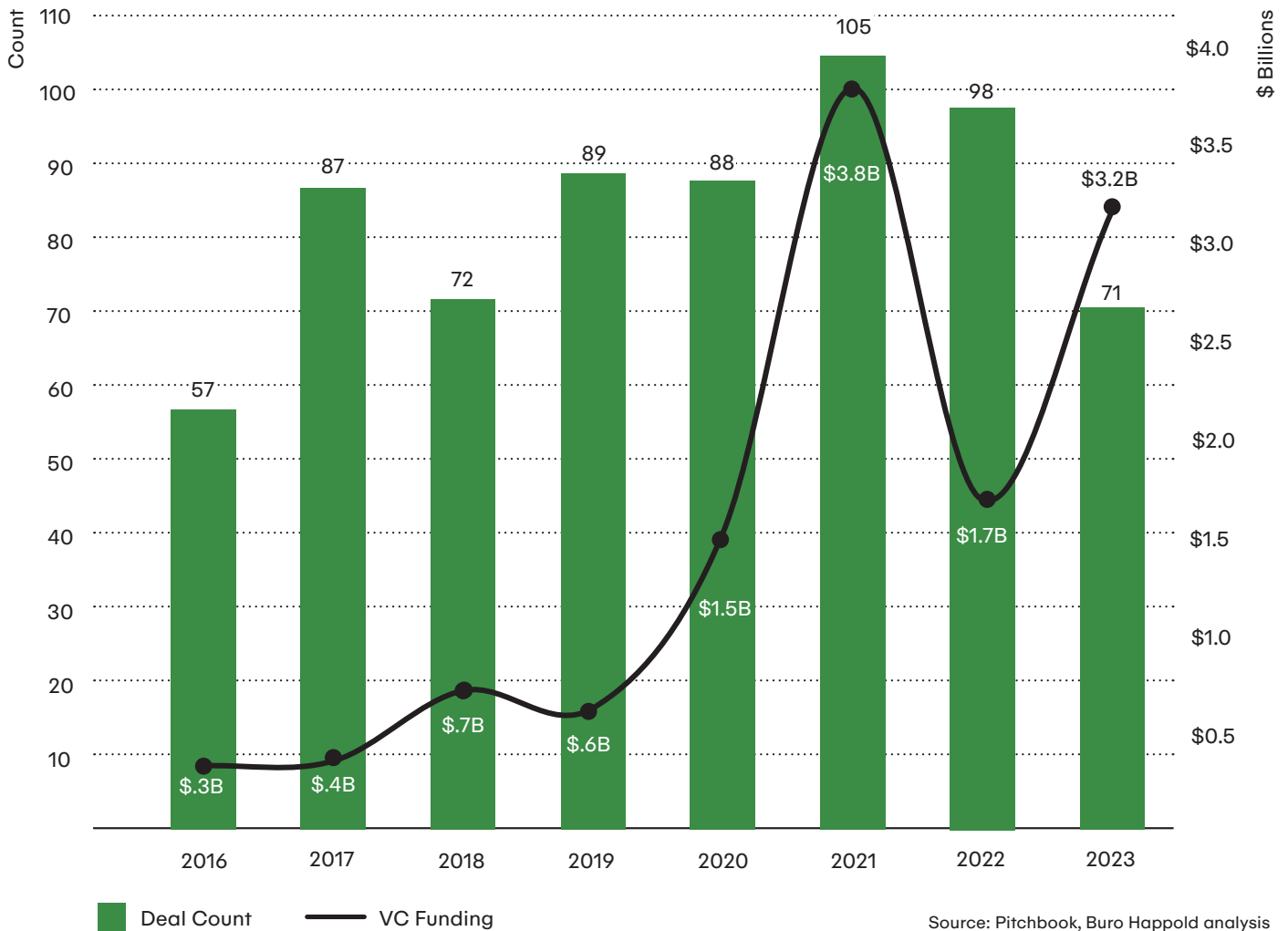
In fall 2023, New York City launched “Getting 97 Done,” a plan for delivering on the goals of LL97.

The plan includes four elements:

- 1. Identifying financial resources that will support retrofit projects toward LL97 compliance**
- 2. Enhancing NYC Accelerator, the city’s LL97 technical assistance program, by launching a new formalized program to deliver more information to building owners that must comply with LL97**
- 3. Implementing key enforcement mechanisms via a New York City Department of Buildings (DOB) rule package, with a focus on driving compliance with the law and maximizing emissions reductions**
- 4. Working with New York State to decarbonize the electric system and Con Edison’s steam system**

Read more about [Getting 97 Done](#).

FIGURE 4: NYC METRO CLIMATE TECH DEAL COUNT AND VENTURE CAPITAL FUNDING 2016–2023



4. PRIVATE INVESTMENT

Private sector companies have also taken proactive action by investing enormous amounts of capital into the green economy transition and shifting their business practices. The global volume of climate-oriented equity transactions in private markets increased more than 2.5 times between 2019 and 2022, from \$75 billion to \$196 billion.²⁴ The private sector provided about 63 percent of clean energy financing between 2016 and 2020, globally.²⁵ In the NYC Metropolitan Area, venture capital investment in climate tech companies surged by over 800 percent between 2016 and 2023, reaching a peak of almost \$4 billion in 2021. The number of climate tech deals taking place in NYC also increased, growing by 25 percent between 2016 and 2023. Investor enthusiasm and a favorable macroeconomic environment made 2021 a record-breaking year for climate tech venture investment in NYC. In 2023, following a particularly

challenging year for global venture investment because of macroeconomic headwinds, climate tech venture investment in NYC rebounded to a near-record high.

Continuing to mobilize significant private sector investment is critical to growing the green economy at the pace necessary to achieve our climate goals. According to the International Energy Agency, around 70 percent of clean energy investment over the next decade will need to be carried out by private developers, consumers, and financiers to reach net zero by 2050 globally.²⁶ Private investment in the green economy is already ramping up nationally. Since 2021, companies have announced \$255 billion in green economy investments in the US, consisting of \$133 billion in EVs and batteries, \$103 billion in clean energy, and \$19 billion in biomanufacturing.²⁷ NYC is well positioned to capture a significant share of these future investments and grow the local green economy.

Working in Partnership Across Sectors

ENVIRONMENTAL & ECONOMIC EQUITY

Persistent environmental inequities—from the disproportionate burden of polluting infrastructure to the lack of access to healthy foods—create profound economic, social, and health disparities across New York City. Due to legacies of discrimination, economically disadvantaged communities and communities of color are disproportionately impacted by these environmental inequities. As climate hazards like extreme heat and flooding continue to increase in frequency and severity, these same communities are often the most vulnerable to their impacts.

For these reasons, the Adams administration is centering environmental justice within its climate agenda—one of the most ambitious in the country. NYCEDC and NYC Talent have worked closely with the Mayor’s Office of Climate & Environmental Justice to ensure the investments and interventions in this plan—which address multiple climate and environmental challenges—are made with the goal of ensuring that New Yorkers who have been particularly impacted by environmental burdens are best positioned to access the family-sustaining opportunities from the green economy. Moving forward, we are committed to working closely with environmental justice communities to ensure the development and implementation of our workforce priorities are effective in meeting this critical goal.

Collaboration between industry and the public sector is essential to bring new innovations to market, evolve market standards, ensure the green workforce reflects the diversity of New York, and bring green solutions to scale. Effective public-private partnerships can break down adoption barriers, particularly in capital-intensive and technology driven subsectors like renewable energy and building decarbonization. A key example of effective partnership is the City and State providing financial incentives to spur the adoption of solar energy systems. The City has launched its Solar Electric Generating Systems Tax Abatement Program and the State its NY-Sun program. NYSERDA has provided funding to over 45,000, mostly small and distributed solar projects in NYC since 2000, creating over 445 megawatts (MW) of additional solar capacity and contributing to accelerated investment and thousands of jobs. To continue producing and accelerating these results, it’s essential the private sector take proactive leadership through innovation, leadership, and investment.

PUBLIC PRIVATE PARTNERSHIP CASE STUDY

THE CLEAN HEAT FOR ALL CHALLENGE



Mayor Eric Adams and Governor Kathy Hochul announce the Clean Heat for All Challenge in front of NYCHA's Woodside House. Source: Ed Reed/ Mayoral Photography Office

The Clean Heat for All Challenge is an initiative spearheaded by NYCHA, NYPA, and NYSERDA, which includes a \$70 million initial investment in the development and production of 30,000 new heat pump units for use in New York City Public Housing facilities.²⁸ In 2022, the funding was awarded through a competitive challenge to Gradient and Midea America to develop and deliver heat pumps for existing multifamily buildings.

Gradient's mission is to provide innovative, US-made window heat pumps that provide year-round comfort while significantly reducing energy consumption and emissions. This partnership marks a significant leap toward a more sustainable future, where innovation and collaboration between public and private partners drives accessible and efficient electrification. The partnership additionally aids the City in achieving its decarbonization goals, elevating residents' comfort, and bolstering infrastructure resilience.

The challenge allowed Midea America to play an integral part in product development, manufacturing, performance, and installation of window heat pumps for NYCHA residents.

The partnership also creates green economy jobs, as heat pumps and window upgrades will require electricians, engineers, and maintenance workers to service the equipment over time. NYCHA will procure these vendors directly, and workers will include Section 3 resident hires and recent Clean Energy Academy graduates. NYCHA's shift toward electrification, along with broader initiatives in the city, is generating demand for cost-effective and efficient solutions such as the packaged window heat pumps. Easy installation and maintenance of these products opens up a broader range of job opportunities, making technical skills more accessible and expanding employment potential in this field.

PUBLIC PRIVATE PARTNERSHIP CASE STUDY

NINEDOT ENERGY X NY GREEN BANK

NineDot Energy installs a battery storage system in NYC. Source: NineDot Energy

NineDot Energy is a clean energy company based out of NYU's Urban Future Lab in Brooklyn. The company creates technology solutions to support a clean, resilient, and equitable New York City grid, with a focus on battery storage. NineDot's goal is to have 400MW of battery storage systems in development by the end of 2026 to strengthen the local power grid and provide stable, reliable, and resilient power to tens of thousands of households and businesses.

In July 2023, NineDot announced the closing of a \$25 million revolving credit debt facility provided by NY Green Bank (NYGB), a division of NYSERDA and a leader in financing clean energy projects throughout New York State. This funding will support NineDot Energy's growing pipeline of battery

storage projects in the New York City Metro Area. NineDot is also committed to building a diverse green workforce and is participating in NYSERDA's workforce development program, which provides wage reimbursement for new employees receiving on-the-job green skills training and encourages hiring from disadvantaged communities.

For NY Green Bank, this transaction represents another step toward the New York State's Climate Leadership and Community Protection Act (CLCPA) target of developing 3000MW of storage by 2030 and ensuring that at least 35 percent of the benefits of clean energy investment are directed to disadvantaged communities.

PUBLIC PRIVATE PARTNERSHIP CASE STUDY

URBAN WOOD REUSE PILOT



Brooklyn Woods trainees process milled lumber from salvaged logs in Greenpoint, Brooklyn. Source: NYC Parks

As part of the NYC Urban Forest Agenda, a coalition of 50+ organizations committed to ensuring that trees and their benefits are equally accessible for all New Yorkers, NYC Parks is leading the Urban Wood Reuse Pilot. The Pilot demonstrates a new way of handling wood waste from NYC Parks' tree removals. NYC Parks has partnered with Tri-Lox, a Brooklyn-based milling and manufacturing company that works with local, sustainable wood, to salvage trees from park reconstruction projects for reuse rather than sending them to landfill.

From the East Side Coastal Resiliency (ESCR) coastal projection project, NYC Parks has already salvaged 192 trees with potential for at least 100 more. Salvaged logs will be milled into lumber

by trainees from the Brooklyn Woods program of Brooklyn Workforce Innovations, which offers low-income New Yorkers training in woodworking and fabrication, before being turned into new wood products by Tri-Lox in Greenpoint, Brooklyn. These products can then be reused in the same parks from which they were salvaged as benches, stakes for future trees, and picnic tables, and can also be processed into flooring, paneling, and other furniture.

Lessons learned through this pilot will help guide the establishment of a permanent wood salvage and reuse program at NYC Parks and will enable the capture of carbon, creation of new green jobs, and support a circular system for local wood salvaged from NYC parks at scale.

Green Economy Forecast

FORECAST BY 2040

NEARLY

400K

GREEN ECONOMY JOBS

\$56B

IN ANNUAL GREEN ECONOMY EARNINGS

\$89B

IN ANNUAL GREEN ECONOMY CONTRIBUTIONS TO NYC GDP

Estimates represent the forecasted jobs, earnings, and contributions from the activities listed in Table 2.

NEARLY

250K

TOTAL JOBS ADDED TO NYC'S GREEN ECONOMY

↳ 175K

ESTIMATED TRANSITIONING JOBS

↳ 75K

ESTIMATED NET NEW JOBS

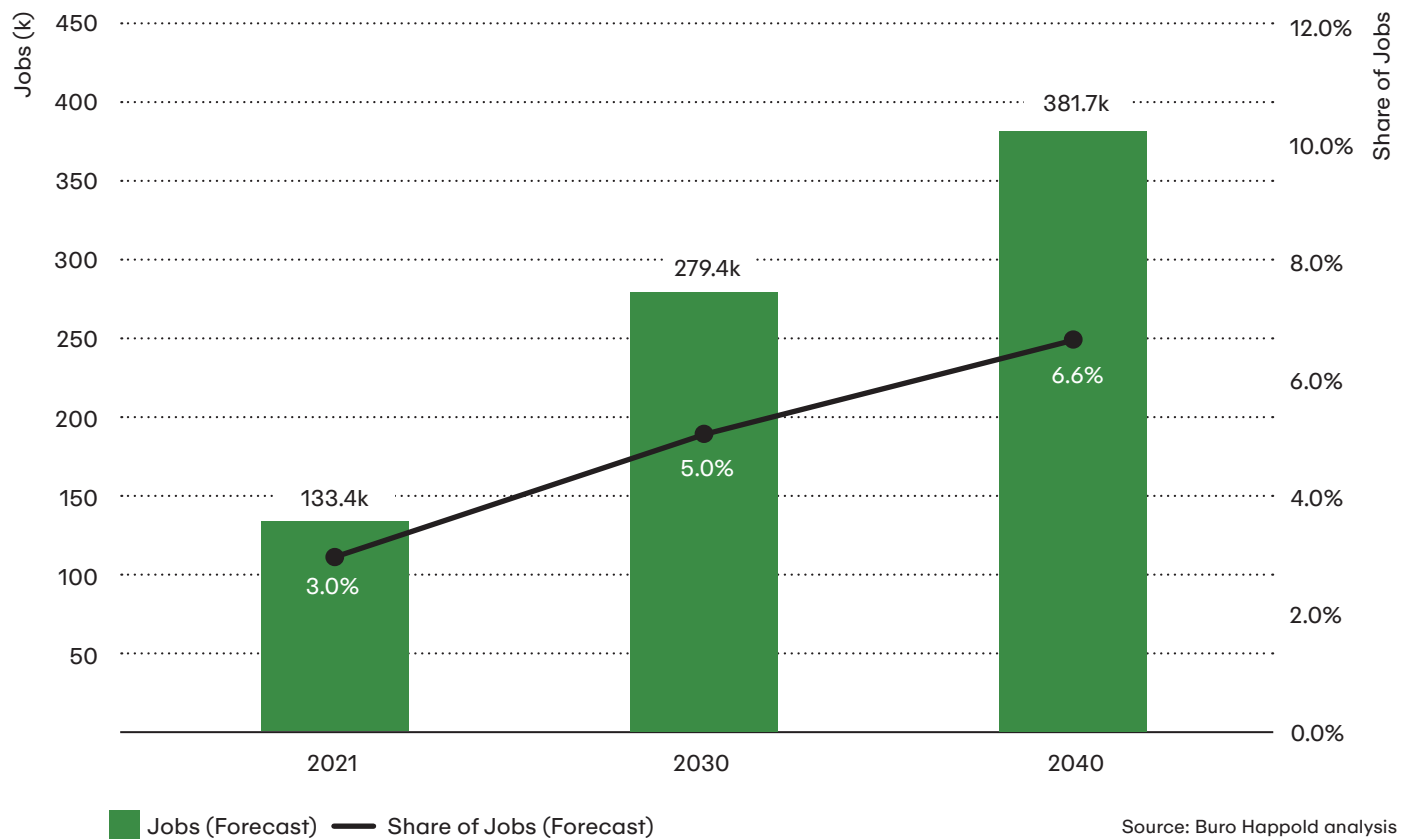
To understand the magnitude of potential economic opportunity, we forecasted the jobs, earnings, and value that will be generated by NYC's green economy over the next two decades. This forecast is based on subsector-specific job projections that account for the required investment to achieve current City and State climate goals and an assessment of anticipated market trends. It assumes that existing commitments will be fulfilled and that other investments will steadily continue, but not drastically accelerate. This analysis was supplemented by existing research conducted by the New York State Climate Action Council's Just Transition Working Group, national and global industry growth trends for specific subsectors, forecasts for similar industries in peer cities, and insights from industry stakeholders.

We project that the green economy could become one of the city's largest industries and workforce ecosystems in the next decade, reaching nearly 300,000 jobs, or 5 percent of total jobs, by 2030. This is more than double the green economy jobs in 2021 and represents a growth rate of nearly 10 percent per year, about four times that of the overall city economy. NYC's green economy workers could gross a total of \$39 billion in earnings annually by 2030, while NYC's green sectors could contribute \$61 billion annually to the City's GDP, about 2.5 times more than in 2021 by both measures.ⁱ

By 2040, NYC's green economy could reach nearly 400,000 jobs. Because many of our current commitments and investments are expected to be implemented in the current decade, the rate of green economy growth is projected to slow to 3 percent per year after 2030. This growth rate reflects the eventual maturation of emerging sectors and subsectors, but is

ⁱ Projections do not include induced jobs, earnings, and GDP contributions.

FIGURE 5: NYC GREEN ECONOMY JOBS (FORECAST)



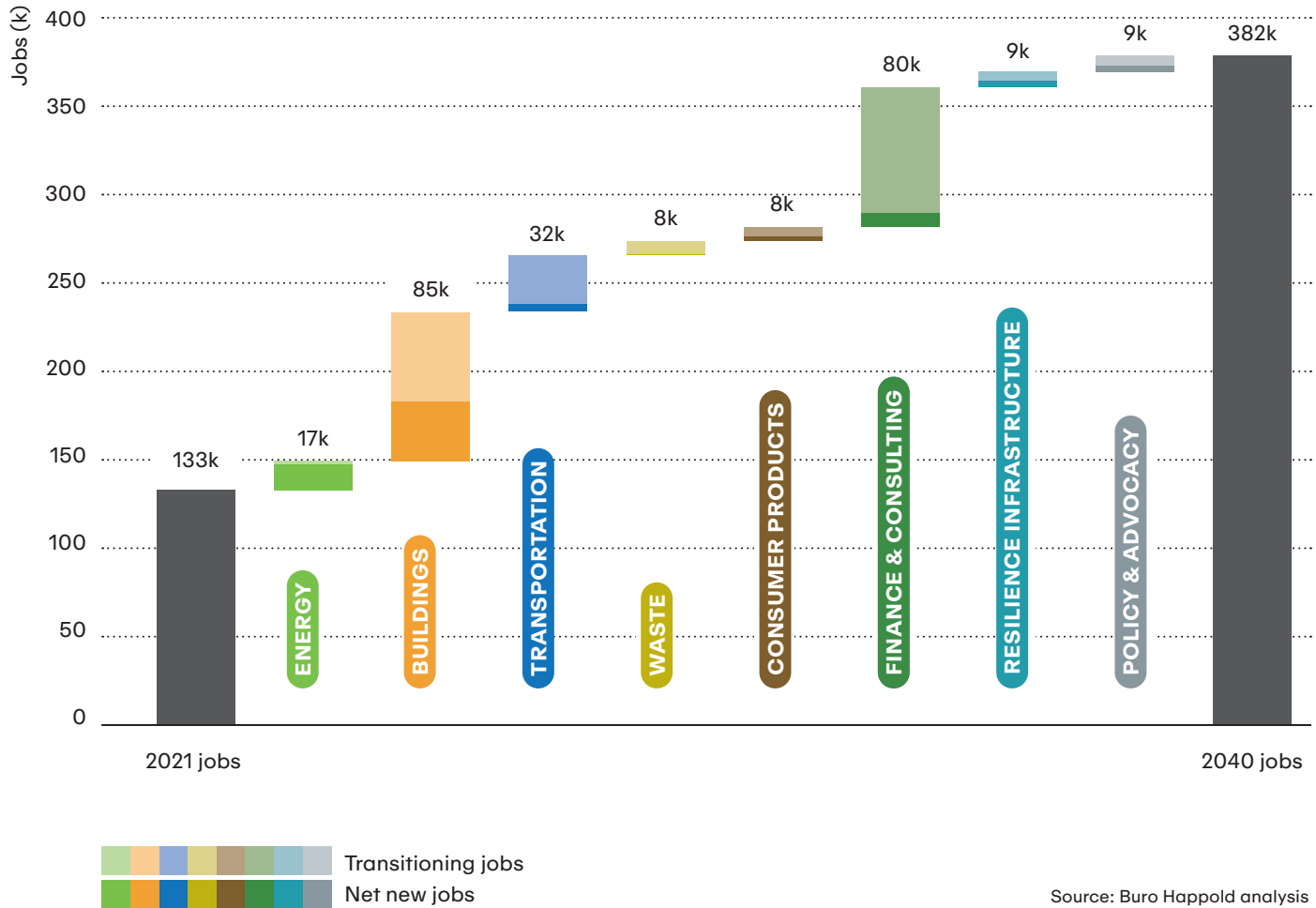
still elevated compared to the overall city economy's projected growth rate of 0.4 percent per year after 2030.²⁹ By 2040, green economy workers could earn a total of \$56 billion annually and green sectors could contribute \$89 billion to the City's GDP, about 3.5 times more than in 2021 by both measures.

We estimate there could be nearly 250,000 more jobs in the green economy by 2040 than in 2021. More than half of this job growth is expected to be driven by jobs transitioning into green economy jobs as they evolve to have a greater focus on decarbonization. However, the growth of new green sectors and increased demand for green products and services could also create tens of thousands of new jobs. Between 2016 and 2021, several new subsectors emerged around new green businesses and technologies. This includes offshore wind, micromobility, and sustainable food. For example, about 50 new sustainable food companies launched in NYC during this period, creating new jobs in areas such as biotechnology and alternative proteins. Of the projected 250,000 jobs added to the green economy through 2040, we estimate that nearly

75,000 jobs could be newly created jobs and nearly 175,000 could be transitioning jobs.

The various sectors that comprise NYC's green economy are forecasted to grow at different rates and include varying shares of new and transitioning jobs. For example, the buildings sector is projected to increase by roughly 85,000 jobs by 2040, of which two thirds could be jobs transitioning from the traditional architecture, engineering and construction (AEC) sector. A large part of this growth could be driven by government legislation, like NYC's LL97 and LL154, which limit building emissions and ban natural gas and fossil fuels in most new buildings starting in 2026 (see Appendix C for more details). Separately, the growth in the finance and consulting sector by 80,000 jobs could be largely driven by shifts in investor preferences toward more sustainable opportunities as well as greater demand for financing in climate-focused organizations and projects, bolstered by federal tax incentives expanded by the Inflation Reduction Act, as well as the Infrastructure Investment and Jobs Act and the CHIPS and Science Act of 2022.

FIGURE 6: NYC GREEN ECONOMY FORECASTED JOBS BY SECTOR (2021–2040)



Source: Buro Happold analysis

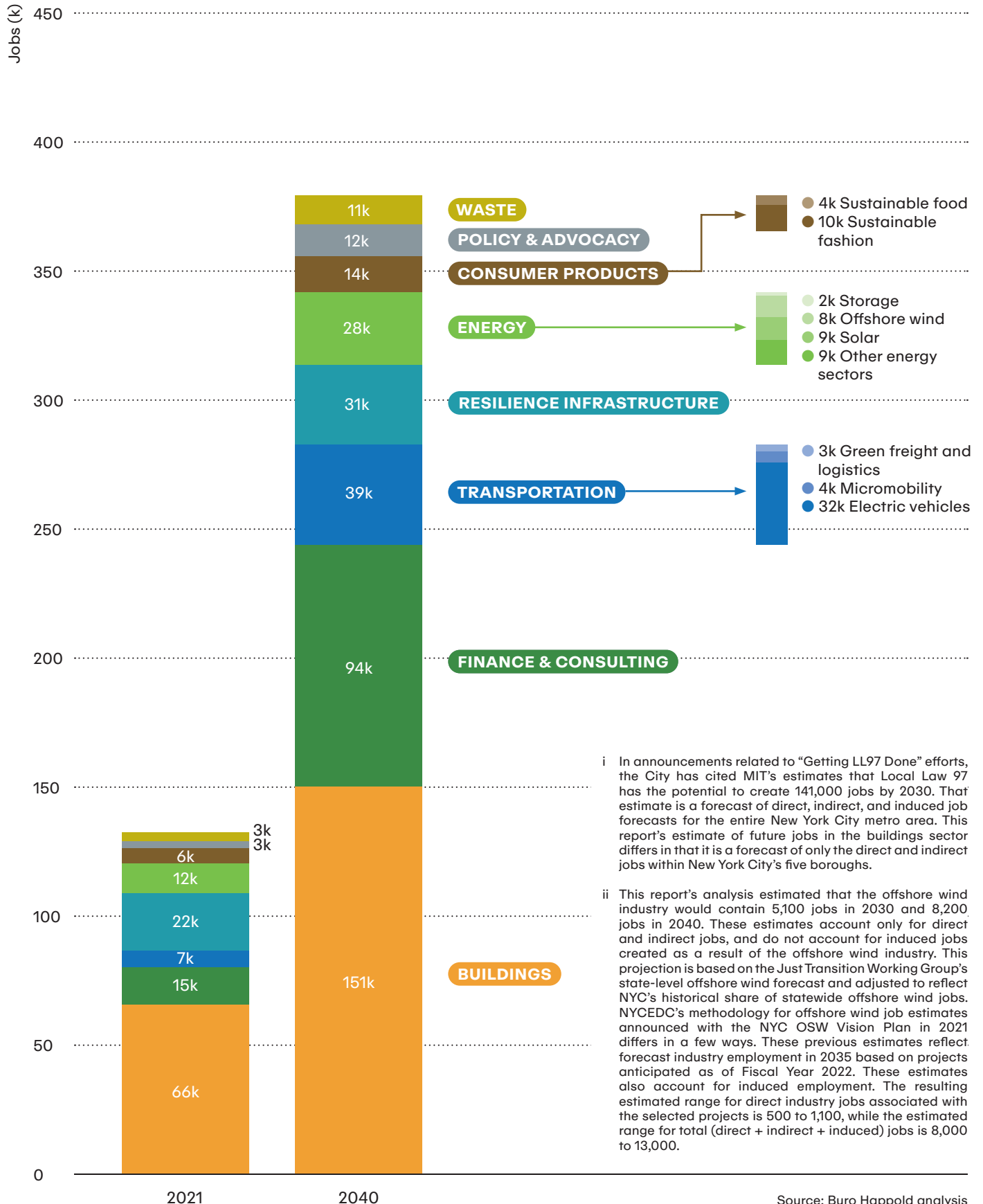
While all sectors are projected to increase in size by 2040, the buildings and finance/consulting sectors represent roughly 65 percent of NYC’s green economy job growth. Many sectors are expected to at least double in size within that timeframe, including the building and finance and consulting sectors, the energy, transportation, consumer products, and policy and advocacy sectors.

This forecast does not account for the potential job losses that could result from the green transition because the magnitude of these losses in NYC is expected to be negligible, especially compared to the magnitude of new job additions. While NYC’s economy is not heavily reliant on carbon-intensive sectors for employment, NYSERDA has forecasted that about 3,000 jobs in the fossil fuels and automotive sectors could be displaced in NYC by 2030 due to the transition to a low-carbon economy.³⁰ It is important for

the City to take steps to ensure a just transition. New Yorkers with jobs that could be displaced often have transferable skills for employment in green sectors. Ensuring access to these green job alternatives and providing the upskilling where necessary will be critical to NYC’s mission to support both a green economy and a just transition.

Achieving the City’s ambitious vision to become carbon neutral by 2050 will require concerted, collaborative public-private action including securing a significant share of federal and State dollars earmarked for climate action. The forecasted growth of the green economy is neither a given nor a ceiling, but points to the extraordinary potential of NYC’s green economy if we execute on our commitments. If we can ensure that and more, we can accelerate progress and surpass these projections (See Appendices A and B for details around our forecast and our sensitivity analysis).

FIGURE 7: NYC GREEN ECONOMY 2021 JOBS AND 2040 FORECASTED JOBS BY SECTOR^{i,ii}



i In announcements related to “Getting LL97 Done” efforts, the City has cited MIT’s estimates that Local Law 97 has the potential to create 141,000 jobs by 2030. That estimate is a forecast of direct, indirect, and induced job forecasts for the entire New York City metro area. This report’s estimate of future jobs in the buildings sector differs in that it is a forecast of only the direct and indirect jobs within New York City’s five boroughs.

ii This report’s analysis estimated that the offshore wind industry would contain 5,100 jobs in 2030 and 8,200 jobs in 2040. These estimates account only for direct and indirect jobs, and do not account for induced jobs created as a result of the offshore wind industry. This projection is based on the Just Transition Working Group’s state-level offshore wind forecast and adjusted to reflect NYC’s historical share of statewide offshore wind jobs. NYCEDC’s methodology for offshore wind job estimates announced with the NYC OSW Vision Plan in 2021 differs in a few ways. These previous estimates reflect forecast industry employment in 2035 based on projects anticipated as of Fiscal Year 2022. These estimates also account for induced employment. The resulting estimated range for direct industry jobs associated with the selected projects is 500 to 1,100, while the estimated range for total (direct + indirect + induced) jobs is 8,000 to 13,000.



Working in the Green Economy

Employers in the Green Economy

There are a diverse array of businesses and organizations in New York City’s green economy. They range from energy solution companies like Microgrid Networks implementing energy storage to fashion companies like FABSCRAP founded on the principles of reducing commercial textile waste. They also include family-owned mechanical engineering consulting firms supporting high efficiency building retrofits and electrification, as well as financial institutions with new green finance teams, and mobility startups whose services are accessed through a mobile app.

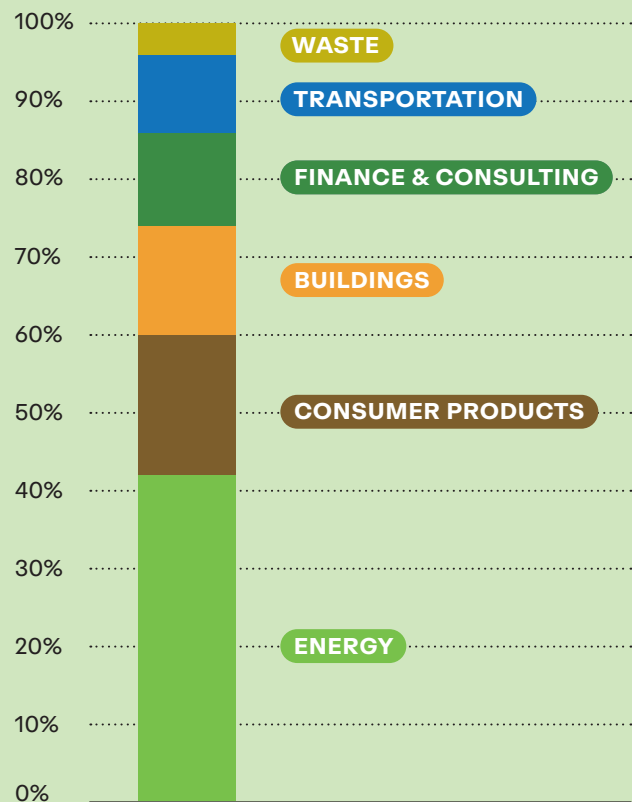
The profiles on the subsequent pages highlight companies and organizations driving activities in NYC’s green economy.

CLIMATE TECH IN NYC

Climate tech companies are a bright spot within New York City’s green business landscape. As of 2022, the NYC Metropolitan Area is the third largest climate tech ecosystem in the world after the Bay Area and London, with 179 active climate tech companies and VC investments reaching almost \$4 billion in 2021. Continued growth is promising as NYC climate tech VC activity has generally been growing at a faster rate than the broader VC ecosystem in NYC and has been more resilient to recent economic downturns both in capital invested and deal volume.

The makeup of New York City’s climate tech ecosystem is similar to peer cities in that energy companies comprise the largest share at 42 percent. The City is slightly more concentrated than peers in the buildings and consumer products industries, at 14 percent and 18 percent respectively.

CLIMATE TECH COMPANIES BY GREEN ECONOMY SECTOR IN THE NYC METRO (2022)



ITSELECTRIC

Founded in 2021, itselectric is a Brooklyn-born pre-seed company implementing scalable and efficient EV charging solutions in NYC. itselectric's co-founder is a member of NYCEDC's Founder Fellowship Program, which supports a diverse community of tech startup founder teams by providing access to resources and networks to build and scale their enterprises. By bringing EV charging to city curbs and partnering with local property owners to access untapped electricity, itselectric is working to scale equitable, convenient, and affordable EV charging.

In dense cities like NYC, itselectric is using energy from buildings to power a publicly accessible curbside charger. Instead of requiring costly and time-consuming new utility connections, their Level-2 charging posts use a behind-the-meter approach to draw spare electrical supply from adjacent buildings at zero cost to property owners. itselectric offers not only affordable charging across communities but a revenue share with partnering property owners—everyone involved directly benefits from EV infrastructure being deployed within their neighborhoods.

In April 2023, itselectric launched Pilot One: NYC in collaboration with Hyundai Motors America and NYCEDC at the Brooklyn Army Terminal. The pilot yielded overwhelmingly positive feedback, establishing itselectric's technology as a reliable and practical solution for urban EV charging needs. Most importantly, this pilot has brought EV charging infrastructure into areas that were previously “charging deserts” and provides a replicable model for other cities to follow.

BRIGHTCORE ENERGY

Brightcore Energy provides end-to-end energy efficiency and renewable energy solutions to large commercial, institutional, government, and utility entities with a primary focus on the New York City market. Brightcore services are fully integrated and include project feasibility assessment, engineering and design, construction and development, implementation, financing and incentive management, and system performance monitoring. Energy conservation measures include geothermal heating and cooling, solar PV, LED lighting, energy storage, EV charging, and building controls.



Brightcore Energy develops, implements, funds, and maintains end-to-end energy efficiency and renewable energy solutions. Source: Brightcore Energy

Brightcore's notable NYC projects include the largest mixed-use development in the state to use a geothermal heating and cooling system; as well as a century-old landmark building in the heart of Manhattan where Brightcore drilled and installed a geothermal system in the basement in what was originally the building's coal room.

Brightcore was founded in 2015 and has its corporate headquarters in Armonk, NY. Additional locations include Brooklyn and Rock Tavern, NY. The company is a NYPA-approved vendor, was awarded NYSERDA funding for demonstration projects, and has expertise in federal and State incentives. Brightcore is a Minority and Women-Owned Business Enterprise (M/WBE) and prioritizes M/WBEs in sourcing subcontractors and vendors alike.

FRESH MEADOW MECHANICAL CORP

Fresh Meadow Mechanical Corp. is a family-owned design-build HVAC contractor and mechanical engineering consulting firm working on residential and commercial high-rises as well as institutional and power generation facilities. Fresh Meadow has 250 employees who work across its mechanical and chiller service divisions, plumbing, electrical, and boiler-making teams, and an in-house logistics outfit that supports these operations.

Prior to 2018, Fresh Meadow had not worked on any building electrification or high efficiency retrofit projects. That all changed when they bid for and won contracts to work on Disney's new headquarters at 4 Hudson Square and the new Terminal One at JFK, which focused on the electrification of hot water systems and the utilization of waste heat. Sustainability-focused work now makes up nearly half of Fresh Meadows' business.

Fresh Meadow has extensively worked with M/WBEs, as many of their projects require 30-40 percent M/WBE participation. Most of the company's employees are also union members. The training they've received in new and emerging technologies through their unions has enabled the company's workforce to adapt to new, growing green opportunities.

FABSCRAP

Located in Brooklyn, FABSCRAP aims to end commercial textile waste by recycling and reusing fabrics. The team of 15 currently works with 800+ fashion, interior design, and entertainment companies to collect unwanted or excess materials. It also operates fabric thrift stores making usable, saved-from-landfill fabrics, leathers, yarns, and trims accessible to New York City's creative community of students, artists, crafters, creators, and makers.

FABSCRAP currently works with brands and mills to recommend improvements in fashion sampling and design, which will help the industry move beyond reuse and recycling to reduce fashion waste at the onset. FABSCRAP also leads a robust volunteering program and spends ~200 hours per year in classrooms and at events to share their work. Over 8,000 individuals have volunteered at their warehouse to sort incoming material, and as of 2023, they have saved over 1.5 million pounds of fabric from landfills.

URBAN FUTURE LAB

Since its founding in 2009, the ACRE (Accelerator for a Clean and Resilient Economy) Incubator, which grew into the Urban Future Lab (UFL) in 2014, has played a key role in accelerating the growth of climate tech innovation in New York. Part of the NYU Tandon School of Engineering, UFL has helped over 170 companies develop novel solutions to decarbonize the economy and urban infrastructure. For each public dollar spent, UFL's startups have raised



FABSCRAP volunteers sort incoming textile waste and prepare the materials for reuse. Source: FABSCRAP

\$288 from the private sector with support from NYSERDA's program.

In collaboration with key industry partners, UFL's programs include New York State's longest running incubator, tech-focused accelerators, and the Clean Start educational certificate program, run with NYU's School of Professional Studies. Across all five programs, UFL's startups have raised \$2.3 billion and created over 4,100 jobs.

ACRE, UFL's flagship program, is a two-to-three year business incubator program helping climate tech companies by providing access to strategic advice, introductions to industry stakeholders, marketing and branding support, investor networks, and a community of like-minded founders.

In addition to ACRE and CleanStart, UFL's active accelerators include the Carbon to Value Initiative (C2V), Offshore Wind Innovation Hub (OWIH), and the Innovate UK Global Incubator Programme. The C2V Initiative is for companies converting carbon into high value end products in partnership with Greentown Labs, Fraunhofer, and NYSERDA. A partnership accelerator program, C2V brings exclusive access to industry leaders and nonprofit experts who are shaping the carbontech marketplace of tomorrow.³¹

Supported by NYCEDC, the OWIH is led by Equinor in partnership with bp. Collaborators also include the Urban Future Lab at the NYU Tandon School of Engineering and the National Offshore Wind Research &

Development Consortium. This year, the OWIH was launched to work with innovators to scale and bring novel technological solutions to the rapidly growing US offshore wind industry.

The Innovative UK Global Incubator Programme is a transnational program specifically designed to accelerate the path of market entry in the United States for early-stage climate-focused technologies from the UK.

UFL has relied on State, City, federal, and corporate funding in the past, and various startup companies have won federal Small Business Innovation Research (SBIR) or Sunshot grants from the government.

AMOGY

Brooklyn-based technology startup Amogy aims to accelerate the global journey to net zero by building technology that converts ammonia into a clean

energy source. Since its founding in 2020, Amogy has grown to more than 190 employees across the United States, Norway, and Singapore, including 100 employees based at its headquarters in the Brooklyn Navy Yard, where the majority of the company's R&D and product development activities are taking place.

Amogy's ammonia-to-power system has been demonstrated in a 5kW drone, 100kW tractor, and 300kW semi-truck, and is currently being scaled to 1MW to be demonstrated in a tugboat which will be the world's first ammonia-powered vessel. Amogy aims to enable the decarbonization of the hard-to-abate sectors, such as shipping, power generation, and heavy-duty transportation, with its ammonia-based, carbon-free, high energy-density power solution. While Amogy has not received federal investment to date, the company has been advocating for ammonia as an energy carrier to be eligible for current and future initiatives and funding opportunities. Amogy's portfolio consists of a total of 67 patents and applications, of which 20 have been issued or allowed thus far, and the company has received \$220 million



Amogy engineers synthesizing, preparing, and testing catalyst materials in the lab. Source: Amogy



Live deployment of ElectricFish at Gateway National Recreation Area in partnership with Jamaica Bay Rockaway Parks Conservancy and the National Park Service. Source: ElectricFish

in funding to date after successfully completing its Series B fundraise. As of September 2023, Amogy has expanded its operations to Houston, Texas to open a new \$40 million manufacturing facility in 2024.

ELECTRICFISH

ElectricFish is a climate-tech start-up established by an all-minority founding team, driven by the urgency of the climate crisis and the need to accelerate decarbonization. The company's novel battery-integrated EV fast charger doubles as a resilient backup power system. These types of systems can increase grid capacity by discharging the battery when demand for EV charging exceeds available capacity and then recharging during periods of low demand on the network. ElectricFish's battery-integrated fast charger provides convenient, decentralized, and accessible energy infrastructure to a site while helping spur

mass EV adoption, supporting local grid reliability, and advancing a resilient energy transition.

Founded in 2019, the company's 2023 NYC pilot project at the National Park Service's Gateway National Recreation Area in Brooklyn at Floyd Bennett Field is part of a larger effort to cultivate local energy storage capacity and innovation in NYC. ElectricFish, alongside community partner Jamaica Bay-Rockaway Parks Conservancy, aims to support the surrounding communities' economic and environmental resilience. ElectricFish is a member of the Resilient Energy Studio cohort, which is a partnership between NYCEDC and Newlab in collaboration with Con Edison that supports startups advancing urban energy storage technologies.

New York City presents an exciting and well-aligned market for the company because of its ambitious goals to cut transportation emissions and accelerate

resilient technologies that help overcome risks associated with climate change. ElectricFish envisions continuing to bring their technologies to grid-constrained areas across the city, especially in historically underserved communities. In May 2023, the company was awarded a \$1.7 million manufacturing grant to ramp up production, and plans to launch its commercially available system in late 2024.

HAYDAN CONSULTANTS

Founded by a Caribbean immigrant, Haydan Consultants is a certified minority-owned business located in Rosedale, Queens. The company provides a suite of professional services to the construction industry, including project management, construction management, and project controls for infrastructure projects in the energy, transportation, facilities, and water sectors. Since its founding in 2019, Haydan Consultants has grown to employ 70 team members.

Haydan Consultants has supported a variety of key City projects, including providing construction management and inspection services at NYC Department of Environmental Protection's (DEP) climate-resilience sites and mechanical/electrical/plumbing (MEP) inspections for NYCHA's geothermal plants at Jackson Houses. The company has supervised the



Microgrid Networks team testing new battery modules at Maspeth facility.
Source: MGN

installation of high efficiency boiler upgrades at NYC Health + Hospitals/Harlem and provided upgrades to transmission infrastructure that are crucial to bringing offshore wind power to Long Island.

In 2023, Haydan Consultants participated in NYCEDC's Offshore Wind Waterfront Pathways Program, which helps increase opportunities for M/WBEs in the offshore wind and waterfront industries. The training helped position Haydan Consultants for future opportunities in the clean energy sector, which will help the State and City meet their clean energy targets.

MICROGRID NETWORKS

Microgrid Networks (MGN) was founded in New York City and has grown to 15 full-time employees since its establishment in 2020. The company currently operates out of its headquarters in North Brooklyn. MGN's primary objective is to implement energy storage in New York City to eliminate reliance on fossil fuel generation, while improving the electrical infrastructure to reach carbon neutrality.

MGN is actively developing eight projects in New York City. The first two projects are now energized to serve the Ridgewood and Maspeth networks and bring 10MW/40MWh of energy storage to the grid—representing approximately 30 percent of NYC's utility-scale energy storage capacity.

The company has taken advantage of the IRA tax incentives for energy storage and works closely with NYSERDA to employ summer interns who may qualify for full-time employment.

UA PLUMBERS LOCAL 1

UA Plumbers Local 1 has played a pivotal role in New York City's construction and plumbing industries for over 130 years, since it was chartered in 1889. The union currently includes up to 6,000 members and operates a rigorous Joint Apprenticeship Training Program with their partners at the Association of Contracting Plumbers, which includes 10,000 hours of field training and 1,070 hours of classroom education from certified experts.³² Currently, the union includes over 500 apprentices in training, and they graduate approximately 100 apprentices to journey-person level annually. They also provide certification and recertification classes to hundreds of existing journeyworkers each year.



Union Square Ventures (USV) hosts an event on climate tech policy and the Inflation Reduction Act in September 2023. Source: USV

UA Plumbers Local 1 has embraced the emergence and popularization of climate technologies such as heat pumps and waste heat recovery, which prompted them to diversify their traditional skills training program to prepare a workforce that is well-positioned to meet the demands of decarbonizing NYC's buildings and infrastructure. Green jobs training and associated skills are not new concepts to UA Plumbers Local 1, as their program helped develop, and has included, Urban Green Council's GPRO training for almost 15 years, but in recent years their curriculum has expanded. They now train members in solar and electric heat pump water heating system installations and maintenance as the plumbing industry transitions away from the use of fossil fuels.

UA Plumbers Local 1 members are currently installing geothermal systems and heat pumps that provide energy source for domestic hot water production at two NYCHA Jackson Houses in the Bronx. The project is part of a larger effort to reduce emissions by 40 percent in buildings that exceed 25,000 gross square feet by 2030 under NYC Local Law 97.

UNION SQUARE VENTURES

Union Square Ventures (USV) is a New York City-based venture capital firm. Since its founding in 2003,

USV has invested in early-stage technology companies and projects. USV invests at the edge of large markets being transformed by technological and societal pressures and its portfolio companies have included Twitter, Etsy, Coinbase, Duolingo, Stack Overflow, MongoDB, and Carta. USV has launched eight early-stage funds, four opportunity funds, and two climate funds.

USV's two recently launched climate funds invest in companies and projects that provide mitigation for or adaptation to the climate crisis. Mitigation is working on the causes of the climate crisis through either emissions reduction or drawdown of existing greenhouse gases from the atmosphere. Adaptation is working on the consequences of the climate crisis, such as increased flooding. USV has invested in a wide range of solutions, including nuclear, retail electricity, electric vehicles, waste fuel and e-fuel, soil and forest measurement, organic carbon removal, inorganic carbon capture, and flooding prediction and analysis.

USV is also a founding member of the Venture Climate Alliance (VCA) which launched in 2023 with a mission to lead a movement to achieve net zero emissions among venture capital firms and their portfolio companies. USV is also a co-chair of NYCEDC's Venture Access Alliance, a coalition of NYC startup

investors aiming to increase diversity in the city's tech and venture ecosystem.

CONSERVATION LABS

Conservation Labs is a mission-driven startup that uses AI technology to continuously monitor water usage and identify water flow estimates, leak alerts, and insights to help residential and commercial properties manage water consumption and prevent costly damages. The company was founded in Pittsburgh in 2016 and has grown to 22 full-time employees with more than 100 ongoing projects since receiving seed funding in 2019.

As Conservation Labs has advanced their work around reducing water consumption and increasing energy efficiency, it was motivated to implement projects in NYC because of Local Law 97 and opportunities presented by the city's large building stock. The company was selected by JLL Technologies and UrbanSense through the PropTech Piloting Program as one of three pilots in NYCEDC's inaugural cohort of companies and it is piloting the H2know product at the Brooklyn Army Terminal.

The company aims to solve challenges associated with water consumption and machine performance with AI to positively impact our built environment and planet. Conservation Labs creates products like H2know, a smart water monitor that decodes sounds to monitor water usage and identify leaks and communicate appropriate interventions via an app. The product has been deployed for various use cases such as offices, hotels, and residential properties. H2know consistently helps reduce water consumption by 20 percent or more, reducing total utility costs and carbon emissions, and generates a return on investment (ROI) over 300 percent. In addition to H2know, the company is actively working on a product that enables sustainable machine management through AI monitoring to identify inefficiencies and reduce energy consumption in machines that have pumps and motors such as commercial laundry equipment and HVAC systems.

ENERTIV

Enertiv is a New York City-based real estate technology company that provides a suite of software tools to commercial real estate owners and operators. The platform reinvents traditional real estate workflows for maintenance, ESG reporting, tenant utility

billing, and capital planning by centering them around decarbonization and integrating real-time monitoring to drive insights. Enertiv has been operating since 2011 and has had an annual profit growth rate of 84 percent in the last four years and is projected to grow more than 300 percent by 2025.

Enertiv, selected by JLL Technologies and UrbanSense through the PropTech Piloting Program, is one of three pilots in NYCEDC's inaugural cohort of companies piloting at the Brooklyn Army Terminal, where they will establish an automated submetering infrastructure across 15 submeters, which will provide transparency on energy usage and associated costs to building tenants.

Software solutions like Enertiv's platform are essential to achieving the City's decarbonization goals given the platform's data-driven insights that help building operators reduce energy consumption and associated emissions. Enertiv will provide precise calculations to accurately differentiate the tenants' energy consumption against the common area loads. This, combined with Enertiv's insights, could incentivize tenants to reduce consumption and give NYCEDC, as well as other landlords and building managers, clarity into how to develop tenant partnerships around decarbonization.

VYCARB

Founded in 2022, Vycarb is a Brooklyn-based startup on a mission to empower communities around the world with the tools to measure and remove carbon emissions. Vycarb developed a novel low-cost technology that senses carbon dioxide in water and enables the real-time measurement of safe, ecologically beneficial carbon removal and storage in nature.

The lack of measurement, verification, and oversight in the carbon removal market is one of its most significant barriers to scaling. Vycarb empowers communities to directly monitor the impacts of carbon on local water resources through an automated, low-cost process. This technology was first demonstrated long-term on Governors Island through the Center for Climate Solutions and led to Vycarb's first carbon removal purchase from Stripe Climate in 2023. Vycarb is committed to fostering a diverse and inclusive workforce, with one-third of employees currently from traditionally underrepresented backgrounds in science and engineering.

The Emerging Green Economy Workforce

Our ability to reach the projected growth in the green economy by 2040 depends on having a large workforce that is representative of New York City’s diverse communities and well-prepared to meet the growing demand for green talent.

While the growth of the green economy will require workers in hundreds of different types of jobs with varying skills, there are a set of occupations that are particularly important to grow and train that require green-specific skills and knowledge. Stakeholder interviews conducted through this process have demonstrated that solar developers are currently struggling to hire electricians in the city. This has required some of these employers to provide construction workers with *ad hoc* training in electrical systems, which can delay installations and limit the number of solar projects they can take on. Some energy solutions companies undertaking building decarbonization projects for property owners struggle to hire project managers with engineering degrees and experience working with newer energy efficiency technologies. Similar workforce challenges also exist in the nascent battery storage sector, which also requires project managers with knowledge of newer technologies who can lead the deployment of these systems. Such shortages can prevent green economy companies from scaling up and employing people in other supporting occupations like human resources, sales, or administration.

Addressing these workforce-driven bottlenecks also provides a unique opportunity to create pathways to good jobs and economic opportunity for New Yorkers. In addition to supporting the overall growth of the

green economy, these opportunities can and should provide economically secure careers for a diverse range of New Yorkers. Emerging opportunities in the green economy can present a pivotal opportunity for economic mobility and growing a more equitable and inclusive workforce.

This Action Plan highlights a set of 21 “focus occupations” for the City and the workforce provider ecosystem to help grow and train in order to support green economy growth and provide economically secure careers for New Yorkers. To identify these focus occupations, we conducted a workforce assessment of various green economy sectors and consulted industry stakeholders to identify which green



Solar power is installed at NYCHA buildings. Source: NYCHA

economy occupations require green-specific skills and knowledge. That list was then narrowed based on the expected demand for each occupation over the next decade and its ability to provide dynamic pathways for upward mobility for workers in those roles. The selected focus occupations either typically pay more than a family-sustaining wage of \$63,000 per year, or provide robust pathways into jobs that pay a family-sustaining wage and therefore provide an opportunity to target jobs and training to economically disadvantaged communities.

Crucially, many of these occupations that pay family-sustaining wages are accessible even to New Yorkers without college degrees. This challenges the common perception that a college degree is the only way to attain a stable career with family-sustaining wages. The green economy presents well-paying job opportunities for New Yorkers who cannot, or do not choose to pursue a college degree before entering

the workforce. For example, in the solar subsector, individuals with little to no experience in construction can start as junior solar system installers, learn on the job, and advance to more senior installer positions with more skills and electrical knowledge, and eventually become forepersons—management roles that lead crews of installers. Forepersons working on construction projects can progress further by taking on larger projects or transition out of field work and become office-based project managers for project developers. In the building decarbonization sector, construction trades workers, such as electricians or plumbers, are positioned to become first-line supervisors after several years of experience working on energy efficiency projects and can eventually progress to construction management roles.

Expanding awareness of such career opportunities can enable more New Yorkers to participate in the green economy and get on a pathway to economic mobility.

FOCUS OCCUPATIONS

“Focus occupations” are defined by the following attributes:

- Are unique or critical to the green economy, requiring green economy-specific skills and knowledge. Without these occupations, the workforce will not be well positioned to undertake the work required to achieve our climate goals;
- Allow for economic mobility, as they pay family-sustaining wages, or are pathways into occupations that pay family sustaining wages;
- Are expected to increase in demand over the next decade.

The **21 focus occupations** fall within four occupational categories:

→ **Construction, Installation, and Operations**

- Roofers
- Solar PV Installers
- Maintenance & Repair Workers
- Construction Laborers
- Glaziers
- Carpenters
- HVAC Mechanics & Installers
- Plumbers
- Electricians
- Stationary Engineers & Boiler Operators
- First Line Supervisors of Construction Trades
- Facilities Managers
- Energy Auditors

→ **Design and Engineering**

- Architects
- Civil Engineers
- Electrical Engineers
- Mechanical Engineers

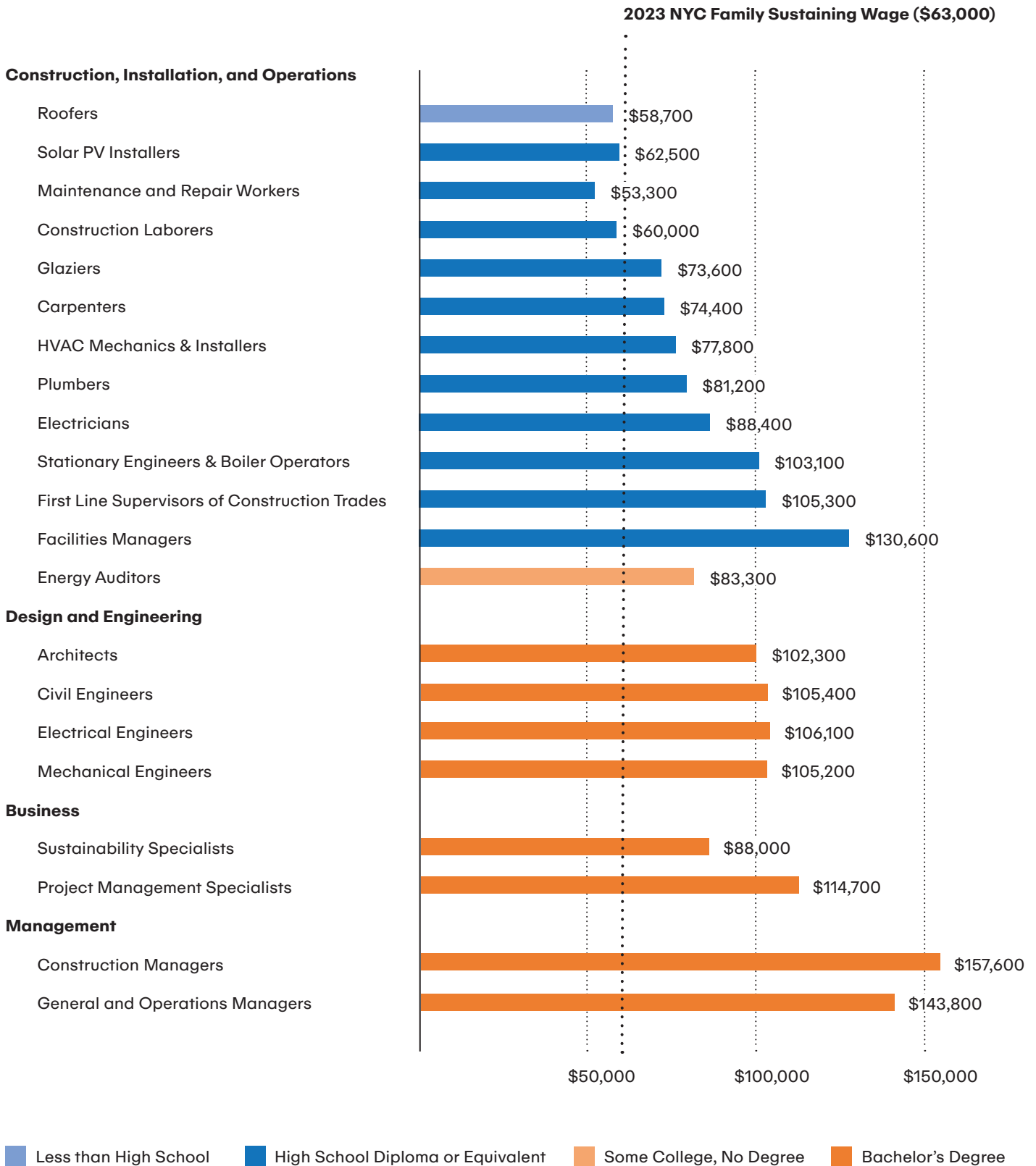
→ **Business**

- Sustainability Specialists
- Project Management Specialists

→ **Management**

- Construction Managers
- General & Operations Managers

FIGURE 8: MEDIAN ANNUAL WAGE AND MOST COMMON EDUCATIONAL ATTAINMENT FOR NYC GREEN ECONOMY FOCUS OCCUPATIONS CITYWIDE (2023)



Source: NYS Department of Labor, Lightcast, Buro Happold analysis

ADDITIONAL IMPORTANT OCCUPATIONS FOR THE GREEN ECONOMY

Research & Development Occupations in the Green Economy

While the aforementioned “focus occupations” are key to achieving our climate goals and driving significant growth in the green economy, there are some occupations that will be critical to unlock New York City’s climate innovation potential and push the scale of New York City’s green economy ambition to new heights. These occupations are primarily rooted in basic and applied science and research and development, and require advanced STEM degrees to develop and scale new climate innovations, primarily across three green economy sectors: energy, buildings, and consumer products.

While NYC leads the nation in the number of graduates with STEM-related degrees and is home to over 100 higher education institutions, there are particular advanced STEM roles critical to meet the needs of the green economy that are currently in short supply in NYC.

ENERGY AND BUILDINGS:

Some occupations that are needed to create new renewable energy generation, energy storage, heat recovery systems, and new types of sustainable construction materials, include:

- Materials scientists
- Chemical engineers
- Nuclear engineers
- Thermofluidics engineers
- Electrochemists

CONSUMER PRODUCTS:

Occupations that are needed to create new types of sustainable food products (e.g., alternatives to animal meat) as well as sustainable materials for the fashion industry, include:

- Food scientists
- Microbiologists
- Biochemists
- Precision fermentation engineers
- Cell membrane engineers

These occupations are high in demand and short in supply. While the total number of R&D establishments focused on physical, engineering, and life sciences has nearly doubled since 2017, there were fewer than 1,500 workers in the occupations listed above in New York City in 2022. While the majority of these occupations pay high salaries, often greater than \$100,000 annually, it is important to note that this workforce is lacking in diversity, per American Community Survey data. To ensure that New York City seizes the economic opportunity to be a leader in climate innovation, it is critical that the City make concentrated efforts—both to support higher education institutions to increase STEM degree attainment across a more diverse subset of New Yorkers, particularly for the roles highlighted above—and to create workforce pipelines between existing New York City graduates and these specialized advanced STEM occupations.

Support Occupations in the Green Economy

There are also opportunities for New Yorkers in many types of jobs that do not require green economy-specific skills. These include sales representatives, public relations specialists, marketing specialists, accountants, and auditors. These supporting jobs are necessary for the functioning of any business and they will see an increase in demand as new and existing businesses grow in the green economy.

The supporting occupations that pay family sustaining wages and have high growth rate forecasts across our economy over the next decade are:

- Software developers
- Market research analysts and marketing specialists
- Accountants and auditors
- Lawyers
- Sales representatives of services
- Financial managers
- PR specialists
- Management analysts
- Sales reps (wholesale and manufacturing)
- HR specialists

New Yorkers in the Green Economy

The wide range of activities and employers in the green economy creates diverse job opportunities ranging from roles in construction and finance to sales and administration. Enabling New Yorkers to acquire necessary skills and knowledge to access these job opportunities requires building a comprehensive understanding of the green economy job landscape. Most occupations in the green economy are not specific or unique to green sectors, with fewer than half of all green jobs requiring green-specific skills. Today, it is estimated that:

- **A very small proportion of jobs** are in new occupations that are unique to the green economy and require green economy-specific skills and knowledge (e.g., solar installers, energy auditors, or compost microhaulers)
- **Fewer than half of the jobs** in NYC's green economy are in existing occupations that will require green economy-specific skills and knowledge to work in green sectors (e.g., electricians working on renewable energy projects, HVAC specialists

installing heat pumps, or mechanical engineers designing new energy efficient heating and cooling systems for buildings)

- **Up to a third of the jobs** are in existing occupations that require green economy-specific knowledge but not skills (e.g., bankers financing renewable energy projects or sales people working at a solar company)
- **Fewer than a quarter of jobs** are in existing occupations that require no green economy-specific skills or knowledge (e.g., human resources specialists, accountants, or cashiers)

This means that many New Yorkers are already well-positioned to transition to the green economy. Organizations in NYC's green economy typically employ workers in a range of occupations with varying levels of green economy-specific skills and knowledge. The following pages show a collection of New Yorkers working in the green economy today, what they do, and how they got there.

DIOR ST. HILLAIRE,

Co-Director, BK ROT;
Founder, GreenFeen OrganiX



Dior is a Bronx native working to reimagine New York City's waste management system by increasing the local processing of organics. She oversees operations at BK ROT, a nonprofit bike-powered food waste hauling and composting service. She recently founded GreenFeen OrganiX, a worker-owned cooperative that serves sections of the Bronx and Upper Manhattan with Microhauling and composting at a community garden.

Dior holds a bachelor's degree in urban sustainability and community development from Baruch College and is currently pursuing a master's in environmental policy

“

I saw a gap that wasn't being filled and created something that addressed it. We need more innovators in the sustainability field, people with fresh perspectives and ideas that can make it easier for everyone to get involved.

”

and Sustainability Management at The New School. She holds several other green credentials, including a Master Composter certificate from The New York Botanical Garden sponsored by the Department of Sanitation and another in Compost Operations Training from the US Composting Council.

Dior was first exposed to composting at sleepaway summer camp and became inspired to work in the field after taking a course at Baruch on agribusiness and the food industrial complex.

ETHAN SMITH

Project Manager,
Hunter Roberts Construction Group



In his role at Hunter Roberts, Ethan manages the Battery Coastal Resilience Project, which is one of several projects together known as the Lower Manhattan Coastal Resiliency (LMCR) Project, an integrated coastal protection initiative to reduce flood risk from storms and sea-level rise in Lower Manhattan. Ethan oversees the project's budget, implements cost controls, ensures conformance to design documents, and communicates progress to various stakeholders.

“

Take as many certification courses as you can. Talk to as many people in the industry as possible. Get involved. Learn where the industry is going and get ahead of the curve.

”

Ethan holds a bachelor's degree in geosciences from SUNY New Paltz and is completing his master's degree in environmental geology at Rutgers. He began his career as a staff geologist at firms including LiRo and Langan before pivoting to resilience-focused construction management.

Ethan developed an appreciation for the water while growing up on Long Island and always wanted to pursue a career that helped ensure marine and coastal environments could last for generations to come.

LINDSAY DROGIN

Director,
NY Green Bank



Lindsay is a life-long New Yorker and a Director at the NY Green Bank, a State-sponsored investment fund and division of the New York State Energy Research and Development Authority (NYSERDA). Her work at the NY Green Bank helps fill the financial gaps in clean energy and sustainable infrastructure markets by mobilizing private capital in key energy transition sectors serving New York.

Lindsay spent much of her career in investment banking, originating, and executing structured finance

“
Understanding that rising sea levels threaten my city and way of life compelled me to take action first through volunteer work in the clean energy sector and then by joining NY Green Bank, where I have the satisfaction of working alongside a dedicated group of climate warriors.
”

transactions across industries, including the infrastructure and energy sectors. During her time as an investment banker, she enrolled in a professional certificate course in energy finance from New York University. The course helped her realize that the transition away from fossil fuels to vastly cleaner forms of energy was not just aspirational but was already in progress and expanding across the economy. This prompted her to volunteer in the clean energy sector, and eventually join the NY Green Bank.

CRISTINA GARCIA

Program Manager, Residential Energy
Efficiency & Heating Electrification, Con Edison;
Founder, Latinxs in Sustainability



Cristina is a native New Yorker who manages a Con Edison program that helps increase and accelerate the uptake of building electrification technologies and other energy efficiency measures in 1-4 family homes throughout the city.

She holds bachelor's and master's degrees in environmental engineering from The City College of New York and was inspired to put them to use by addressing greenhouse gas emissions in New York's built environment during an internship at CUNY's Building Performance Lab, which offers continuing education programs for

“
As a native New Yorker, I'm so proud to work on a program that not only helps New York City as a whole by reducing greenhouse gases and combatting climate change, but also helps individual New Yorkers by making their homes more comfortable, reliable, and safe.
”

building operators as well as internships for CUNY students and conducts building systems research and development. Over her career, Cristina has worked at the Mayor's Office of Sustainability, the Building Electrification Institute, and in the construction sector.

She is passionate about diversifying the sustainability workforce and is the founder of Latinxs in Sustainability, a nonprofit that offers mentorship, career exploration, and other resources that seek to get more workers from under-represented communities into clean energy jobs.

LUCIE DUPAS

Chief Delivery Officer,
PowerFlex



Lucie is the Chief Delivery Officer at PowerFlex, a company that develops smart energy storage, solar, and electric vehicle charging systems for commercial customers. PowerFlex (formerly known as EnterSolar) was founded in New York City and has since expanded nationwide.

Lucie holds a master's degree in energy and environmental engineering from the National Institute of Applied Sciences in Lyon, a program that blends electrical and mechanical engineering with entrepreneurial instruction. After moving to New York, she worked at several

“

The massive challenge of deploying renewable energy systems is really exciting. There's so much more to do when you look at all the empty roofs that could be filled with solar!

”

energy consulting firms including Sollega and Bright Power before choosing to specialize in large-scale solar deployment and joining EnterSolar.

Outside of work, Lucie leads the Board and volunteers with GreenHomeNYC, a grassroots nonprofit organization that focuses on sustainability education and provides opportunities for industry professionals to network and learn from one another.

JASON TARULLI

Civetta Mechanical Journeyman,
UA Plumbers Local 1



Jason is a Queens native, a journeyman plumber with UA Local 1, and is employed by Civetta Mechanical, a Bronx-based plumbing contractor. He is currently installing a new water main at Grand Central, an upgrade that will ensure the long-term sustainability and resilience of the station's plumbing.

Jason's first experience with green building systems came in 2019, when his firm was hired to install heat pumps at Manhattan West, a six-building complex in Hudson Yards. Jason had not received any formal training in heat pump installation prior to this project. He learned

“

Coming into the apprenticeship, I had no experience in construction, but after spending enough time working alongside the journeymen, I got to a point where I was comfortable with installing systems on my own.

”

on-the-job by observing and working alongside his more experienced colleagues.

Jason entered the field in 2005 by enrolling in a five-year apprenticeship program offered through UA Local 1. Over the course of his 17-year career, Jason has worked as a foreman on plumbing projects for several high-rise buildings throughout Manhattan.

JO JUMALON

Lead Training & Development Specialist,
Revel



Jo leads the onboarding and education of new employee drivers for Revel, an all-electric vehicle ride-share startup based in New York. Jo is responsible for getting drivers comfortable driving electric vehicles and serves as a resource when they encounter issues on the road.

Jo was a rideshare driver himself who has long been interested in electric vehicles. He felt that this role was an

“
Like every industry, transportation is changing rapidly, so having an open mind and wanting to soak up all the knowledge is absolutely key.
”

opportunity to explore his passion while supporting other drivers in the process.

Jo believes that getting more drivers and riders exposed to electric vehicles can bring about greater adoption of the technology.

TOM BONILLA

Chief Engineer, Hines
International Union of Operating Engineers
Local 94



Tom oversees a team of 16 engineers who are responsible for mechanical, electrical, and plumbing operations, maintenance, upgrades, and other capital projects for 1251 Avenue of the Americas, a 2.3 million-square-foot commercial building managed by Hines. Over his 36-year career, he has worked in more than 10 different buildings in New York City, gaining skills and knowledge related to pneumatic and digital controls, different types of chiller plants, direct and indirect steam and boiler plant heating, and other facets of energy-efficient building operations.

Tom is a member of the International Union of Operating Engineers' Local 94 chapter. In addition to the extensive amount of on-the-job training that Tom received through his work experience, he has completed coursework on energy conservation and other

“
New York City has it all, allowing you to work in buildings of varied ages and with diverse generations of equipment and levels of sophistication of technology. That's how you build the knowledge and experience you need, piece by piece, day by day, year by year.
”

environmentally conscious operating parameters, which Local 94 develops in response to shifting regulations and emerging technologies.

Tom has been essential to the almost 40 percent reduction in annual greenhouse gas emissions for 2019 against a 2010 baseline that was achieved at 1251 Avenue of the Americas. Much of this work included modernizing the building's operations, conducting regular audits of various building systems, and modeling the returns on investment for efficiency upgrades.

Tom believes that onsite operating engineers are the grassroots of sustainability in commercial buildings and that teaching current and future workers how to maximize the energy efficiency of facilities they manage is paramount to the success of these initiatives.

KEVIN BRAITHWAITE

Radiator Technician,
Castrads



Kevin is a radiator technician and a lifelong New Yorker currently residing in Jamaica, Queens and working in Sunset Park, Brooklyn at Castrads North America. Castrads North America is a UK-based company that designs and manufactures custom cast-iron radiators using scrap metal. Reusing materials helps the company reduce greenhouse gas emissions during production and manufacturing.

Kevin has been with the company for two years and provides expertise on installing and maintaining custom

“
Having the ability to provide for myself and my family in a way that is safer for the climate and environment, it gives me peace of mind.
”

radiators across Brooklyn and Manhattan. Without previous work experience in fields linked to the green economy, he initially worked at the company as a dispatch assistant, only handling pallets, accessory orders, deliveries, and various warehouse duties. As he became more familiar with Castrad’s radiators, he learned to assemble them, replace product parts, and fix leaks and damages. As a result of his upskilling, he developed expertise to handle solo onsite duties and provide technical assistance in the field.

TINIA PINA

Founder, CEO and President,
Re-Nuble



Tinia Pina has been the Founder and CEO of Re-Nuble for 7 years, since the company’s inception. Re-Nuble is an M/WBE-certified company that provides solutions to sustainable food growing practices for indoor growers by creating biological fertilizers and peat-free solutions from agricultural waste streams, which helps reduce landfill waste and greenhouse gas emissions.

After studying business information technology at Virginia Tech she moved to NYC and worked as a capital markets auditor. While working in financial services, she was exposed to urban agriculture through volunteering opportunities and became familiar with waste consumption and sustainability, seeing firsthand how limited healthy food options could be. Tinia decided to create a business that would address the challenges associated

“
Reach out to companies, be a value add, research, understand what their needs are, and pitch ideas.
”

with urban agriculture through circularity and upcycling food waste into products with second uses. Gravitating towards the mission of boosting local food production through innovative solutions, she founded Re-Nuble, where the team uses “organic cycling science” to transform food byproducts into sustainable nutrients which can be used in soilless farming and contribute to a minimal carbon footprint.

Tinia’s advice to those interested in climate tech is to join the ecosystem through meetups to connect with individuals and companies to share knowledge. She is also currently a mentor in NYCEDC’s Women.NYC Network which offers opportunities to meet with professionals in high-growth sectors including climate tech.

JOHN STEVENS

Resident Manager, River & Warren Condominium, Battery Park City; Director of Building Operations for one of the largest property management firms in New York City; Consultant, Alternative Sustainability



“
This is about more than just taking some classes and providing some instruction; it’s about constantly asking ‘why’ and changing people’s thinking around buildings and how they work in the process.
”

John is the Resident Manager at River & Warren Condominium in Battery Park City and serves as the Director of Building Operations for a large residential property management company, where he helps their building management teams address mechanical issues and develop strategies for enhancing energy efficiency. John is also a consultant for Alternative Sustainability, a New Jersey-based company that designs and manufactures new, innovative types of HVAC equipment and turbines that can reduce buildings’ energy consumption by up to 50 percent.

John is not an engineer by training, but his upbringing in a household of building managers and superintendents fostered a natural curiosity and commitment to continuous learning. He has carried this curiosity and ethos of continuous learning into his career and believes the best way to learn is to spend time on the job, asking questions, and exploring how things work.

John spent more than 40 years working in the buildings industry, starting as a handyman while in high-school, and working his way up to become a resident building manager and director of building operations for multiple buildings in the city. Over his career, he has commissioned nine different buildings and moved from property to property to gain exposure to new types of building systems and technologies.

Through this work, John identified ways that buildings could become more sustainable and energy-efficient and began exploring ideas for products and technologies that could enhance their performance. John has since designed and tested different types of climate technologies for building systems, both independently and through Alternative Sustainability, with three patents granted and six more pending.

JOHN’S CAREER PATH

Started working as a handyman in high school, and then began working as a building superintendent at age 23



Continued to work as a superintendent at buildings throughout Manhattan



Managed his first LEED-certified building in Battery Park City in 2006



Spent nearly 15 years managing other green buildings, mostly in Battery Park



Began working as an energy-efficiency consultant with Douglas Elliman in 2019



Started exploring ideas for technologies to enhance building energy performance



Joined Alternative Sustainability to continue to design, patent, and scale climate technology products

CLEMENTINE JACKSON

Steamfitter

Enterprise Association of Steamfitters

Local 638



“

I see a building that I worked on and take pride in the fact that I played a role in creating that. I love being able to look at the product of my work and feel like I'm giving back to the community because of it.

”

Clementine is a steamfitter who works on the installation and maintenance of pipes for sprinkler and heating systems in high-rise buildings across New York City. She currently serves as an apprentice with Enterprise Association of Steamfitters Local 638, where she is simultaneously earning a wage and learning the trade, through classroom instruction and on-the-job work experiences facilitated by the union.

Before entering the construction field, Clementine worked as a nurse and in the security field. She was eager to join the construction industry because of her passion for hands-on work. She completed an entry-level three-month construction training program through the Andromeda Community Initiative, a Queens-based non-profit that prepares workers for career opportunities in the building restoration industry. The program equipped Clementine with several credentials that helped her pivot into construction, including a Green Professional Training (GPRO) certificate in green building fundamentals from the Urban Green Council, a program that teaches workers in the building and construction trades how to integrate high-performance practices into their everyday work.

After that, she also participated in the Pathways to Apprenticeship program, which helps New Yorkers gain admission into building trades apprenticeships by providing workforce readiness training, key safety certifications, and exposure to various career pathways in the building trades. This program played a crucial role in helping her secure her current apprenticeship.

CLEMENTINE'S CAREER PATH

Worked as a Licensed
Practical Nurse (LPN)



Pivoted to security and
spent 10 years in the field



Developed interest in the construction field
and started exploring careers in it



Completed a three-month construction
training program through the Andromeda
Community Initiative



Became aware of and
enrolled in the Pathways to
Apprenticeship Program



Joined Enterprise Association of
Steamfitters Local 638
as an apprentice



Working on high-rise buildings and
simultaneously taking classes (as part of
Local 638's apprenticeship program)

ANDREW FISHER

President, AMF Electrical Contracting Corp.
International Brotherhood of Electrical Workers
Local 3



“
The landscape of the electrical industry is changing, creating opportunities that new businesses and workers can tap into if they have the open-mindedness and preparedness to take on this work.
”

Andrew is the founder and president of AMF Electrical Contracting Corp., an MBE electrical contractor that primarily works on building electrical systems across New York City. The firm previously specialized in telecommunications infrastructure, fire detection and alarms, and other standard building electrical systems.

Andrew wanted to capitalize on opportunities in the growing clean energy industry and enrolled in Con Edison's EV Ready program, which prepares contractors to work on charging infrastructure. After completing the program, Andrew and AMF worked on itselectric's first EV charging stations in Brooklyn and ElectricFish's pilot project. He's excited to take on more projects in the clean energy and transportation field.

Andrew holds bachelor's and master's degrees in electrical engineering from the New York Institute of Technology. He has worked as an electrical engineer for over 15 years, with much of that time spent on designing electrical systems for various applications. Prior to starting his own business, Andrew worked as a project manager for several large electrical contracting firms that serve New York's buildings sector.

Andrew is a member of the International Brotherhood of Electrical Workers' Local 3 chapter, which has provided him with access to coursework on project cost estimation and management, solar installation, and electric vehicle infrastructure.

ANDREW'S CAREER PATH

Earned his bachelor's and master's degrees from the New York Institute of Technology



Worked as a Project Manager for the NYC Department of Environmental Protection



Moved into the electrical contracting field, also working as a project manager



Joined the International Brotherhood of Electrical Workers Local 3



Started his own firm, AMF Electrical Contracting Corp.



Participated in Con Edison's EV Ready Program



Installed EV charging infrastructure for itselectric and ElectricFish

MINAIEL SHOAIB

HVAC and Energy Manager,
L+M Development Partners



“
This industry remains niche, with limited awareness among students and fresh graduates. Engaging in career expos and mentorship initiatives fills me with pride because it underscores the pivotal role people play in driving climate action and certainly moving the industry forward.
”

Minaiel recently joined L+M Development Partners as an HVAC and Energy Manager. Serving as a centralized resource on energy and HVAC management, Minaiel drives impact on the company’s building portfolio by increasing the operational efficiency of HVAC systems and helping with decision making of strategic retrofits. Previously, she was a Building Systems Engineer at Steven Winter Associates, where she performed energy audits and building greenhouse gas emissions analyses on existing buildings, which informed recommendations for energy conservation and electrification interventions.

When Minaiel began her engineering degree at The City College of New York, she was entirely unaware of the building decarbonization field and the opportunities that existed within it. After a friend convinced her to take a sustainable energy conversion systems course, she was inspired to pursue an internship at CUNY’s Building Performance Lab, which further cultivated her interest in sustainability and the built environment.

MINAIEL’S CAREER PATH

Enrolled in the City College of New York’s Bachelor’s of Mechanical Engineering program



Took a mechanical engineering internship at Honda in Pakistan



Learned about CUNY’s Building Performance Lab and completed an internship there in 2018



Worked as a mechanical engineering intern at NYC DOB upon completing bachelor’s degree



Joined Steven Winter Associates (SWA) as a Building System Analyst in 2020



Promoted to Building Systems Engineer at SWA



Started a position as an HVAC Manager at L+M Development Partners in 2023

Workforce Challenges in Focus Occupations

There are also specific challenges and disparities that must be addressed in growing these focus occupations. One, the workforce in these occupations generally skews older, suggesting the need to increase the pipeline of younger workers. Two, these focus occupations are not representative of the broader New York City demographic makeup.

1. AGING WORKFORCE AND THE DWINDLING PIPELINE

A large share of many jobs in focus occupations are currently held by older workers. The proportion of older workers in construction, installation, and operations focus occupations is particularly large and growing. Over roughly the last decade, the share of workers over 55 years old in these occupations has increased from 14 percent (in 2009) to 24 percent (in 2021). A continuation of these trends poses a challenge for multiple reasons.

For one, while older workers often possess a deep understanding of legacy building and energy systems, industry representatives have noted that incentivizing these workers to transition into green sectors that require new skills and knowledge can be challenging, especially if there already is a robust pipeline of construction-related work outside of these green sectors.

But more critically, the eventual retirement of these workers over the next decade will lead to an increase

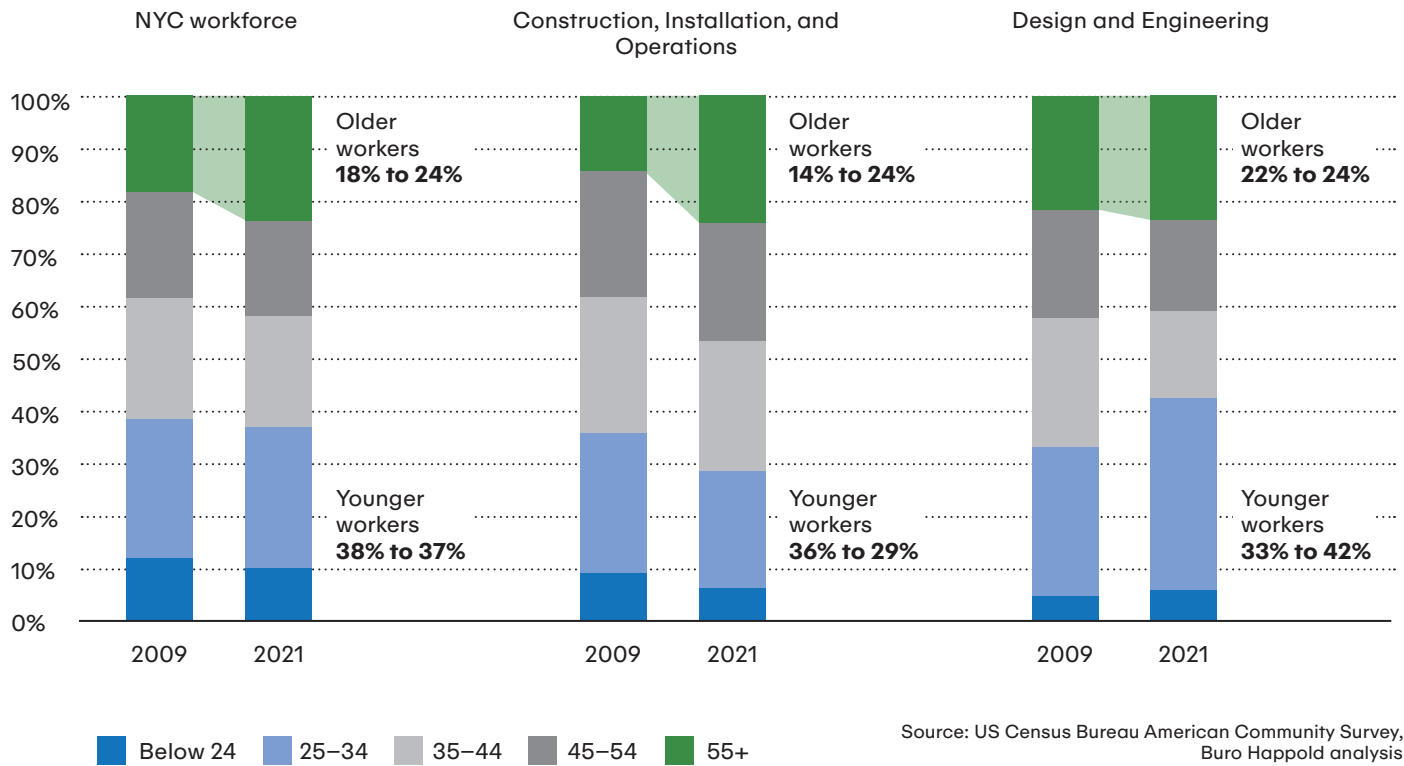
in demand for new workers in these roles, which could be a challenge to fill as fewer young people choose to enter these vocational jobs. Construction, installation, and operations occupations experienced a 7 percent decline in the share of workers under the age of 35, despite the average citywide share of workers in this age group remaining steady over the last decade.

Meanwhile, over the same period, there has been a substantial increase in the proportion of workers in engineering and design professions, which typically require bachelor's degrees. Entrance into the green economy must be accessible to New Yorkers both with and without college degrees and includes multiple pathways to career success. As a growing share of older workers nears retirement, New York City will need new green economy workers of varied credentials to ensure a sufficiently sized workforce equipped to meet clean energy deployment and building decarbonization goals. Promoting these well-paying careers to New Yorkers and preparing a workforce that can step into these pivotal roles as the current workforce nears retirement will be critical for a green economy to thrive in NYC long term.

2. DEMOGRAPHIC DISPARITIES

While the green economy has the potential to enable equitable economic opportunity for a diverse array of New Yorkers with and without college degrees, we are not there yet.

FIGURE 9: AGE DISTRIBUTION OF SELECT FOCUS OCCUPATION GROUPS CITYWIDE (2009–2021)



White workers are overrepresented in more than half of the green economy’s focus occupations (see Figure 10).ⁱ Black, Latino, and Asian workers are most heavily represented in focus occupations that do not pay family-sustaining wages, which are typically entry-level positions (such as construction laborers and maintenance and repair workers, which see 86 percent and 77 percent representation from non-white workers, compared to 65 percent citywide). More senior roles, such as project management specialists and construction managers—where white workers represent 55 percent and 46 percent of the workforce respectively—are significantly less diverse than the rest of the city’s workforce, of which white workers comprise 35 percent.

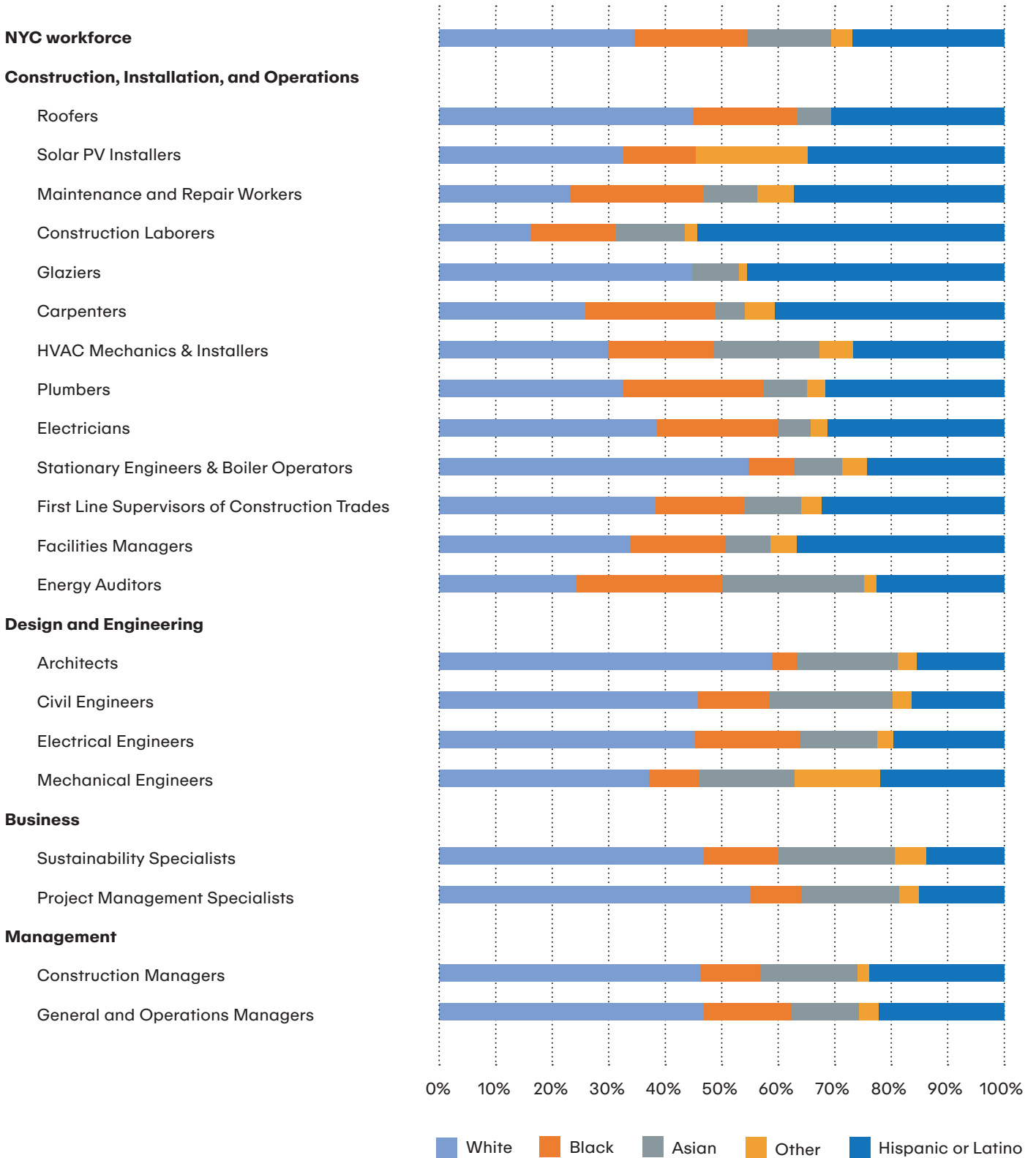
Today’s green economy also has significant gender disparities. This is particularly evident in building and construction trades, where women are greatly underrepresented in focus occupations. Women account for only 2 percent of electricians, plumbers, and carpenters, and 4 percent of HVAC mechanics, which is starkly lower than the citywide average of 50

percent across all occupations. Additionally, there are virtually no women roofers or solar PV installers. This trend is consistent with demographic patterns in construction-related occupations nationally, as women in NYC experience similar barriers as women across the country.³³ These include potential workplace discrimination on construction sites, stereotypes associated with the nature of physical work, lack of encouragement to enter the construction industry, and dearth of supportive services (such as childcare), among others. Similar barriers exist for other well-paying and accessible focus occupations in the green economy, including facilities managers where women account for 24 percent of workers, construction managers (16 percent), and energy auditors (20 percent). Women are also underrepresented in many STEM-related focus occupations, such as mechanical engineering, civil engineering, and electrical engineering.

To ensure that the transition to a green economy helps to overcome economic injustices, we will need to proactively build and promote workforce pathways for underrepresented New Yorkers.

ⁱ Due to data limitations, estimating the demographic composition of jobs in the green economy is not possible. Hence, this analysis looks at the demographic composition of the green economy focus occupations at the economy-wide level.

FIGURE 10: RACIAL AND ETHNIC DISTRIBUTION OF FOCUS OCCUPATIONS CITYWIDE (2021)ⁱ



ⁱ New York City's workforce is herein categorized according to five racial and ethnic groups: Hispanic or Latino people of any race, and non-Hispanic or Latino people in White, Black, Asian, or "Other" racial groups.

FIGURE 11: GENDER DISTRIBUTION OF FOCUS OCCUPATIONS CITYWIDE (2021)



Source: US Census Bureau American Community Survey, Buro Happold analysis

Green Economy Workforce Training Pathways

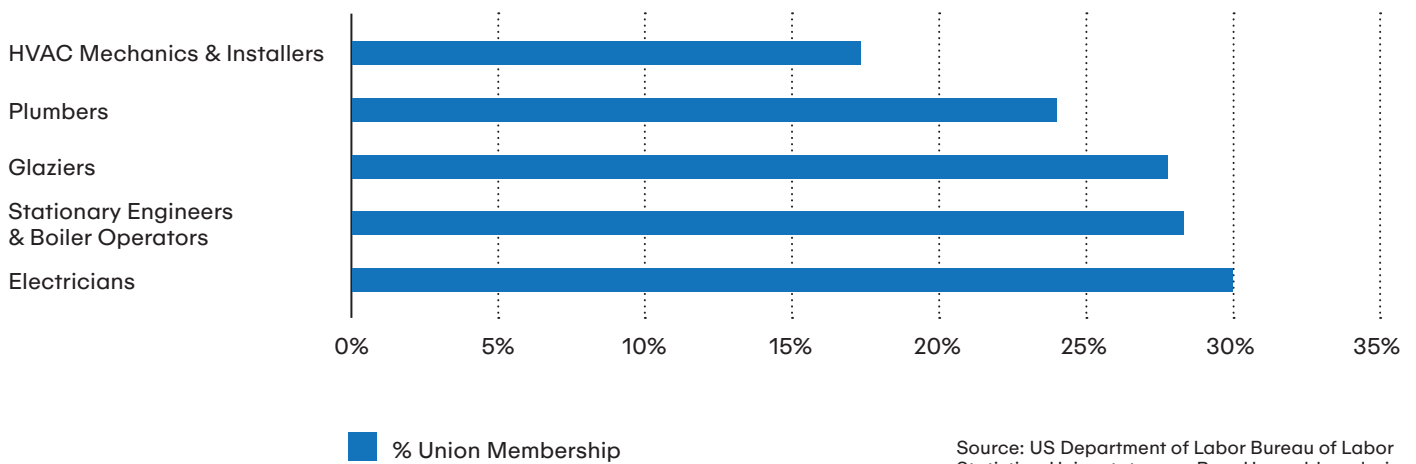
There are already many paths that prepare New Yorkers for green economy jobs. Many organizations are already making significant efforts to adapt their training and educational programs to cater to green economy sectors. However, more needs to be done to ensure we have a robust pipeline of well-prepared workers to enter the green economy over the next two decades.

NYC PUBLIC SCHOOLS

The New York City Public School system is one of the largest and most comprehensive in the nation, with nearly a million students enrolled. In 2022, NYC Public Schools outlined a bold vision for New York City through a reimagined student experience that centers career-connected learning. The vision is to integrate academics to ensure career-connected learning at every stage of a young person's journey, including career-contextualized academics and advising, career exploration, career preparation and training, work-based learning, internships, and apprenticeships. The system's Career and Technical Education (CTE) schools have long provided specialized training and skill development, preparing students for a wide range of professional pathways that are relevant to the green economy, including construction, transportation, engineering, and architecture. For example, more than



Solar One, a nonprofit organization, provides a skills development curriculum in basic construction, electrical, solar panel installation, and maintenance of high efficiency heating and cooling systems. Source: Solar One.

FIGURE 12: FOCUS OCCUPATIONS WITH THE HIGHEST UNION MEMBERSHIP RATES

20 CTE schools incorporate solar installation focused curriculum into existing electrical, engineering, and construction programs.

ACADEMIC INSTITUTIONS

Beyond secondary education, New York City is home to over 100 higher education institutions and leads the nation in the number of graduates with STEM-related degrees, which are particularly important for design, engineering, and innovation occupations within the green economy. Several of these higher education institutions have made strides in aligning their programs with the talent demands of the green economy. For example, Columbia University established the nation's first climate school in 2020, after having already introduced new master's degree programs (such as the Master of Science in Sustainability Management) as well as certification programs (such as in Sustainable Finance and Sustainability Analytics) in prior years. The City University of New York (CUNY) system has launched an Inclusive Economy Initiative to better connect students with industry in a number of sectors, including the green economy. The New York Climate Exchange, a consortium led by Stony Brook University and 15 university, industry, and community partners will be built on Governors Island by 2028, expanding education and training opportunities while accelerating the commercialization of climate solutions for urban environments. The future will necessitate considerably greater investment and deliberate attention from higher education institutions toward transforming curricula to keep up with the evolution of climate-related technologies and systems to prepare thousands of young workers to thrive in the green economy.

UNIONS OR ORGANIZED LABOR

Organized labor unions also play a pivotal role in preparing workers for vocational careers, which are particularly important in the green economy. Many unions offer apprenticeship programs that provide structured, paid learning opportunities, and also provide ongoing education courses for their members, many of which focus on climate-related topics. For instance, the International Brotherhood of Electrical Workers (IBEW) Local 3, representing electrical workers, and UA Local 1, representing plumbers, have introduced specialized courses covering solar installation and heat pump systems, respectively. Such union-driven training initiatives are essential for meeting the demands of the growing green economy and would need to continue to be invested in—both to prepare new workers to enter the green economy and train incumbent workers to undertake work in the green economy. However, only a small proportion of workers in focus occupations are unionized. Of all focus occupations, electricians have the highest union membership rate, at 30 percent, as shown in Figure 12. As such, many green economy workers will have to pursue alternative avenues for training, including employer-led training programs, nonprofit and City-sponsored training initiatives, and credential courses.

NONPROFIT SECTOR

The city also has a robust ecosystem of nonprofit training providers that are already preparing New Yorkers for opportunities in the green economy. For example, Urban Green Council has trained over 20,000 tradespeople, building operators, engineers, construction managers, and other professionals through its Green

COMMUNITY HIRING LEGISLATION

Community Hiring is a new initiative that leverages the City's purchasing power to drive economic mobility by connecting our communities to employment and apprenticeship opportunities on City contracts. The City of New York provides a wide range of services for New Yorkers—from waste water management to decarbonization. To make this possible, the City spends billions of dollars on services provided by City contractors every year. Authorized by State legislation signed in November 2023, Community Hiring allows the City to set hiring goals to require that businesses contracting with the City make best efforts to provide employment and apprenticeship opportunities to low-income individuals and those living in economically disadvantaged communities. Community Hiring goals will apply to a broad range of City contracts for services, including construction of bioswales and resiliency infrastructure, building services such as efficiency and decarbonization, and consulting services such as civil engineering and design. Once fully implemented, Community Hiring

is projected to connect low-income jobseekers to thousands of green economy and other careers and over a billion dollars in salaries annually. The Office of Community Hiring (OCH) is responsible for managing the rollout and implementation of Community Hiring, supporting City agencies and contractors, and reporting on program outcomes. OCH's reporting obligation provides a key opportunity for the City to continuously improve Community Hiring by building partnerships to reach more New Yorkers, developing training programs to better align the skills of jobseekers with the needs of City contractors, and creating shared best practices for City agencies, industry, and community partners. By connecting qualified jobseekers from disadvantaged communities with opportunities and City contractors with a pipeline of capable talent, Community Hiring will foster a more inclusive economy and make procurement work for New York. Community Hiring has the potential to directly align our climate investments with economic mobility for New Yorkers.

Professional Training (GPRO) since 2010. Its educational opportunities range from full-day classes to on-demand short courses to recorded programs. Solar One, a NYC-based nonprofit committed to advancing renewable energy and sustainability through its educational programs, offers environmental education initiatives for K-12 students, as well as technical skills development in basic construction, electrical, solar panel installation, and maintenance of high-efficiency building systems for entry-level and incumbent workers from underserved communities. In partnership with NYCEDC and Empire State Development, Solar One recently broke ground on a new and improved Solar One Environmental Education Center in Lower Manhattan that will be used as a community resource to educate the next generation of environmental leaders. Custom Collaborative, a nonprofit dedicated to training low-income and immigrant women to succeed in the fashion industry, teaches students the art, technique, and business of sustainable fashion design, including designing for zero waste, and using environmentally sustainable materials. These nonprofit organizations and many more across the city have scope to grow as demand for green economy workers grows over the next two decades.

The City has also pioneered green economy-specific workforce training in recent years through agency-specific interventions. For example, in 2022, NYCHA launched the Clean Energy Academy to prepare public housing residents for jobs in the green economy by connecting resident trainees to energy efficiency and renewable energy contractors. The Mayor's Office of Climate and Environmental Justice has launched free online courses for industry professionals in the buildings and energy industry, covering topics like building decarbonization strategies and building energy law compliance. The City is committed to continued investment in such programs and leveraging existing workforce initiatives to increase the pipeline of workers in the green economy, especially those from underrepresented backgrounds. New York State's new Community Hiring legislation will be a key tool for empowering the City to set hiring requirements in City-funded contracts, connecting New Yorkers from economically disadvantaged communities to apprenticeships and jobs in construction and installation occupations, and strengthen the pipeline into green economy focus occupations.

CITY-LED GREEN ECONOMY WORKFORCE PROGRAMS

NYCHA Clean Energy Academy

The NYCHA Clean Energy Academy is a \$2 million program, launched in 2022 by the Fund for Public Housing and NYCHA in collaboration with NYSEERDA, National Grid, the NYCHA Green Revolving Fund, NYPA, Trinity Church Wall Street Philanthropies, NorthLight Foundation, and Rise Light and Power to prepare 100 public housing residents over a two-year period for jobs in the clean energy workforce. The program connects resident trainees to NYCHA energy efficiency and renewable energy contractors who will be performing nearly \$500 million in retrofit and renewable energy projects at NYCHA developments through 2026. The Academy provides stipends to all participants, along with wrap-around social services and career preparation support, to ensure they have the support they need to succeed in the program and beyond. A total of 39 NYCHA residents have completed the 16-week, 240-hour training program as of December 2023.

DCAS Energy Management Institute

To develop a skilled workforce that manages City buildings efficiently, the Department of Citywide Administrative Services (DCAS) created the Energy Management Institute (EMI) in partnership with the City University of New York (CUNY). Through training, EMI helps empower City staff to make energy-smart decisions, implement operational improvements, and advocate for energy retrofits and clean energy projects across the City's built environment. DCAS offers a diverse set of energy management, building operations, and HVAC engineering courses that provide targeted competency-based training and integrate national certification requirements. Since 2009, DCAS has enabled over 1,900 City employees to obtain energy and building operations certifications and has trained over 6,500 learners through EMI.

NYC CoolRoofs

During a typical summer day, the flat, black asphalt rooftops that exist on buildings throughout the city can reach temperatures up to 190°F, which is 90 degrees hotter than the surrounding air

temperature. NYC CoolRoofs provides New Yorkers with paid training and work experience installing energy-saving reflective rooftops, reducing both internal building temperatures by up to 30 percent, and as a result, the need for energy-intensive cooling technologies. This is all provided for free or at a low cost to building owners while leveraging local suppliers. In a partnership between the NYC Department of Small Business Services (SBS), its Workforce1 Industrial & Transportation Career Center, the Mayor's Office of Climate and Environmental Justice (MOCEJ), and The HOPE Program, NYC CoolRoofs provides young New Yorkers with applied skills and an on-ramp to the industry, all supporting the City's goal to reach carbon neutrality by 2050.

CUNY Kingsborough Community College— Maritime Technology Program

The Division of Workforce Development and Continuing Education in partnership with the Maritime Technology program at CUNY Kingsborough Community College (KCC) blends hands-on experience with traditional classroom learning to prepare New Yorkers for opportunities in the city's harbor and beyond. Starting next year, KCC will offer the Global Wind Organization (GWO) Basic Safety Training certificate, a credential necessary for all water-based workers involved in the offshore wind industry. Students will train on the first vessel to wind tower transfer simulator in the country and CUNY I, a hybrid-powered boat used for instruction and research that is also the first of its kind. Additionally, students will train in the state-of-the-art simulator lab for the Crew Transfer Vessel with dynamic positioning. It will be used to teach students safe transfer procedures between a vessel and an offshore wind turbine. During the construction, maintenance, and operation of offshore wind farms, CTV personnel will be in high demand as these vessels transport wind farm technicians, tools, equipment, and personnel to sites daily. In addition to the simulator lab, students will have the opportunity to work hands-on in the RV CUNY I vessel, which is the only hybrid-powered catamaran training vessel in the US.



Action Plan to Grow the Green Economy

New York City’s vision is to host 400,000 jobs by 2040, becoming the anchor of a prosperous, equitable, and just future for New Yorkers. Realizing this vision and positioning NYC at the center of the global economy will require intentional partnership among all people and businesses.


This chapter lays out 63 City commitments across all five boroughs to grow an equitable green economy for all New Yorkers. The commitments support five key goals:

1. **Decarbonize buildings & construction**
2. **Develop a renewable energy system**
3. **Enable low-carbon alternatives in the transportation sector**
4. **Catalyze innovation in climate technologies**
5. **Build an equitable green economy ecosystem**

Realizing these goals requires advancing our workforce. We have embedded the following workforce development tools across our commitments and centered them on the 21 focus occupations critical to the success of NYC’s green economy.

- **Training Facilities** across all five boroughs
- **Place-Based Strategies** to support local hiring
- **Youth Pathways** to ensure that New York City’s education system addresses green economy careers at every stage
- **Skills-Based Training and Apprenticeship** to advance economic mobility
- **Industry Partnerships** to embed industry perspectives in all workforce development work

We will train over 12,000 New Yorkers for well-paying, accessible green economy jobs through apprenticeships and pre-apprenticeships. While prepared and driven by NYCEDC and NYC Talent, this plan is inclusive of economic and workforce development action at all levels of City government. We will further bolster our commitments through partnership with the State and federal government, including by leveraging an expected \$500 billion in available funding opportunities.

We have also included key ongoing or previously announced commitments that are important to the development of our green economy. Some of these commitments overlap with or advance specific initiatives highlighted in PlaNYC, PowerUpNYC, or other City reports. In these instances, commitments and initiatives have been tagged (e.g., ) to indicate alignment.

The 63 commitments laid out on the subsequent pages are the City’s immediate next steps for making New York City a true hub for climate action. Seven marquee commitments denoted with a light green ribbon are expected to be key marker movers. While the City can create an enabling environment for the green economy to thrive and lead by example, we cannot achieve our vision alone. We invite partners across all sectors to take part in City initiatives, lead sustainable transitions within traditional industries, and further invest in the growth and development of green economy companies and jobs.

Goal 1.

Decarbonize Buildings and Construction

The buildings sector makes up the largest share of NYC's green economy today, representing nearly 50 percent of green economy jobs. Our more than one million buildings are responsible for nearly 70 percent of greenhouse gas (GHG) emissions in the city. Green jobs in the buildings sector are expected to more than double by 2040 and be the most significant driver of future green economy growth in NYC.

The City will lead by example to implement ambitious sustainability measures within our own capital projects, redevelopments, and procurements to drive investment in this sector and set precedents for private sector projects. We will create incentives to facilitate financial viability of sustainable building retrofits, and expand our workforce programming to ensure NYC talent can readily take on the ample green buildings and construction work to come.

PROMOTE WIDESPREAD USE OF LOW-EMBODIED CARBONⁱ BUILDING MATERIALS

1. Launch and apply NYCEDC's Circular Construction Guidelines

NYCEDC will release a set of guidelines detailing ways to integrate sustainable and/or reused construction materials, and require their use across all new NYCEDC capital projects wherever feasible beginning in 2024. NYCEDC commits to 75 percent construction

and demolition (C&D) material diversion via reuse/recycling, 95 percent reuse/recycling of discarded concrete and soil, and 25 percent use of sustainable building materials. SPARC Kips Bay, a nearly-2 million-square-foot, first-of-its-kind innovation, jobs, and education center in one of the nation's premier life sciences clusters, will be the first large project to implement the CCG. By using innovative circular construction methods at public sites within the campus, SPARC Kips Bay will reduce 26,400 metric tons of carbon emissions—equivalent to removing nearly 5,800 cars from the road. This project can serve as an exemplar for other large public and private projects.

2. Advance the Mass Timber Studio with selected design teams [\(PlaNYC\)](#)

To support other mass timber projects and familiarize NYC's design and real estate community with mass timber use, NYCEDC is launching the NYC Mass Timber Studio, a grant and technical assistance program supporting NYC-based mass timber projects in the early phases of planning and design, in January 2024. The Studio will work with seven awarded project teams to advance mass timber buildings across the five boroughs. The NYC Department of Buildings (DOB) will provide regulatory guidance, given updated allowances for mass timber included in the most recent Building Code revision.

BOLSTER BUILDING ENERGY EFFICIENCY INITIATIVES

ⁱ Embodied carbon is greenhouse gases emissions arising over the lifecycle of a material or product—including extraction, manufacturing, installation, and disposal.

3. Implement Getting LL97 Done PowerUp

MOCEJ and DOB are implementing a comprehensive plan to cut carbon emissions from the city's large buildings, as mandated by Local Law 97 (LL97) of 2019. The plan includes four key elements: (1) identifying and targeting City, State, federal, and utility-based financing and funding for upgrades; (2) providing building owners with needed technical advice through the NYC Accelerator; (3) implementing key enforcement mechanisms; and (4) decarbonizing central systems in partnership with New York State.³⁴ In addition, the City is creating an ongoing LL97 Mobilization Council to monitor mobilization efforts and compliance, and foster collaboration with stakeholders in three task forces: workforce and building retrofiters, building owners and managers, and financing organizations.

4. Develop Strategic Energy Master Plan for NYCEDC

NYCEDC commits to bringing all assets under direct operational control into compliance with NYC's carbon neutrality goals and exploring all levers to bring other assets into compliance. NYCEDC is developing a Strategic Energy Master Plan (SEMP) which takes a portfolio-wide approach to energy management and greenhouse gas emissions reduction, and has already begun conducting energy audits across 19 million square feet of assets to find specific opportunities for energy conservation and emissions reductions at the building level. NYCEDC will leverage all available federal, State and City funding opportunities for emissions reduction projects, and will continue to partner with DCAS for technical assistance and funding through programs such as Accelerated Conservation and Efficiency (ACE) and Expenses for Conservation and Efficiency Leadership (ExCEL). NYCEDC will also work with other City agencies like DOB to revise Local Law 97 language and increase the number of buildings that must comply with new standards to ensure the entirety of NYCEDC's portfolio is moving toward carbon neutrality. NYCEDC will continue to work with tenants to develop decarbonization strategies to aid this effort and meet the City's carbon neutrality goals.

5. Procure innovative technologies for building retrofits

DCAS is launching a Request for Information (RFI) to source innovative retrofit and building heating technology to support ongoing electrification work, aligned with DCAS' commitment to invest over the next 10 years in retrofits aimed to meet the City's ambitious emissions reductions commitments.

6. Facilitate green commercial retrofits through M-CORE

NYCEDC will facilitate Local Law 97 compliance at Manhattan Commercial Revitalization (M-CORE) projects, driving sustainability within large Manhattan commercial real estate redevelopments. M-CORE provides commercial office building owners with tax benefits to support office renovations located in Manhattan south of 59th Street. The program aims to help decrease building vacancy and attract tenants, including incubator and accelerator operators to generate high-growth companies including those focused on climate tech innovation.

7. Decarbonize NYCHA buildings through Clean Heat for All Challenge PlaNYC PowerUp

As highlighted in PlaNYC, and committed in PowerUp, the City will continue to develop and deliver an initial 30,000 units of cold climate packaged window heat pump units at existing multifamily NYCHA buildings.³⁵ This \$70 million investment made through an industry competition directed at heating and cooling manufacturers demonstrates both City leadership and sends a market signal that can drive additional innovation in green building technologies.

8. Implement Leading the Charge Initiative to electrify schools PlaNYC

In October 2022, the City launched an initiative to electrify existing school and ensure that all new schools constructed are fully electric as well. The initiative is the largest school electrification effort in the nation.³⁶ The upcoming 2025–2029 Capital Plan includes funding for electrification of 33 existing school buildings, a down payment on the 100 schools committed to as part of the Mayor's "Leading the Charge" initiative.

BUILD CONNECTIONS BETWEEN INDUSTRY AND TALENT IN CONSTRUCTION

9. Launch and expand green building apprenticeship programs

NYC Talent will partner with City agencies and the private sector to expand existing and launch new pre-apprenticeship and apprenticeships for electricians, plumbers, project managers, and facilities managers, and building operators to develop 8,000 talent pipelines for building decarbonization by 2040. NYC Talent will also maximize the capacity of the Apprenticeship

Readiness Collective (ARC) and other direct-entry programs to ensure that the incoming generation of talent are aware of and trained in the technical requirements of sustainable construction techniques.

10. Establish community hiring and place-based workforce connection strategies

NYC Talent will collaborate with City workforce and place-based economic development partners to develop neighborhood training and referral networks. These networks will build off community priorities to coordinate City investments, community-based organizations, and existing workforce development infrastructure to ensure green economic growth translates and contributes to good jobs for low-income New Yorkers and targets historic disparities. These place-based strategies will support the equitable growth of the green economy by:

- Enabling close partnership with local communities and service providers to develop manufacturing, maintenance, and construction training pathways in green economy occupations
- Enrolling residents of environmental justice neighborhoods and place-based network catchment areas into Pathways to Industrial and Construction Careers (PINCC) to ensure they have the 1:1 support services needed to successfully navigate their career path
- Connecting local talent to recruitment networks to access job training opportunities
- Connecting employers to talent, in particular to meet Community Hiring goals and help tackle historic economic disparities

PIONEER INDUSTRIAL SUSTAINABILITY AT KEY MANUFACTURING AND FREIGHT HUBS

11. Redevelop wholesale produce market into modern, energy-efficient facility

NYCEDC will redevelop the Hunts Point Terminal Produce Market in the Bronx, which supplies approximately 25 percent of NYC's produce, with significant facility, traffic circulation, and rail connection improvements to drastically reduce industrial freight emissions attributed to truck idling, inefficient traffic

flow, and inadequate facility storage space. The redevelopment is also anticipated to include electric conduit connections to support future electric vehicle (EV) freight charging, which would further reduce emissions from trucks. This project leverages \$650 million in City, State, and federal funding—including a \$110 million US Department of Transportation (DOT) INFRA Grant and \$25 million USDOT CMAQ Grant funding—and over \$250 million in private contributions.

This project was also selected by US Dept. of Labor's Office of Federal Contract Compliance Program's (OFCCP) Mega Construction Project Program to participate in a program focused on fostering equal opportunity in large federal construction projects. OFCCP will provide project sponsors and contractors with free, on-the-ground assistance and resources to strengthen recruitment, hiring, and employment practices.

12. Pilot industrial decarbonization technology at Brooklyn Navy Yard

The Brooklyn Navy Yard Development Corporation (BNYDC) will upgrade and decarbonize two 19th-century buildings at the Brooklyn Navy Yard as pilot projects to test decarbonization strategies and technologies, with the intent of applying learnings to other historical industrial buildings on their campus. Upgrades are expected to be completed in late 2024. As part of the Navy Yard Master Plan, BNYDC will also develop a ~700k-square-foot net-zero vertical modern industrial building typology, to be replicated for future new developments at the Yard. The building will be designed to house climate technology companies alongside traditional manufacturers.

DEMONSTRATE BEST PRACTICES IN SUSTAINABLE CONSTRUCTION AND DEVELOPMENT

13. Demonstrate a Net Zero Campus on Governors Island

The Trust for Governors Island (TGI) has selected the New York Climate Exchange to build a state-of-the-art net-zero academic and research center to anchor the Center for Climate Solutions (see page 79 for additional detail). The New York Climate Exchange's campus includes mass timber construction, on-site power generation, and integration of existing buildings to achieve a net zero energy campus. The



Rendering of Willets Point development including all-electric stadium and 100% affordable housing developments. Conceptual Rendering by HOK

400k-square-foot Exchange will begin construction in 2025 and is set to open in 2028.

14. Build a first-of-its-kind electric stadium at Willets Point

NYCEDC is partnering with NYCFC on the development of NYC’s first all-electric stadium at Willets Point—a \$780 million, privately-financed project—as part of the transformation of Willets Point. In addition to the first-ever soccer-specific stadium in NYC, which will seat 25,000, the project will deliver the largest 100 percent affordable new housing development in NYC in 40 years. NYCEDC will continue to lead by example and set higher standards for sustainable project development.

15. Mandate cutting-edge certifications for large NYCEDC projects

NYCEDC will require all projects over \$2 million to achieve LEED or Envision Gold rating certification, as a minimum, setting standards requiring the construction industry to become more sustainable.

THE CLIMATE INNOVATION HUB

A new world-class innovation hub in Sunset Park



Climate Innovation Hub at the Brooklyn Army Terminal. Conceptual Rendering by FXCollaborative

New York City faces a momentous opportunity to become a global leader in climate innovation and to do so in a way that ensures an equitable future for all. This opportunity is turbocharged by over \$2 billion in venture capital funding flowing to NYC's climate tech sector since 2021, a 400 percent spike over the \$500 million in investment from 2018 to 2020; ambitious City and State climate policy targets; and over \$500 billion in public funding being made available at the State and federal levels to support the nation's shift to a green economy.

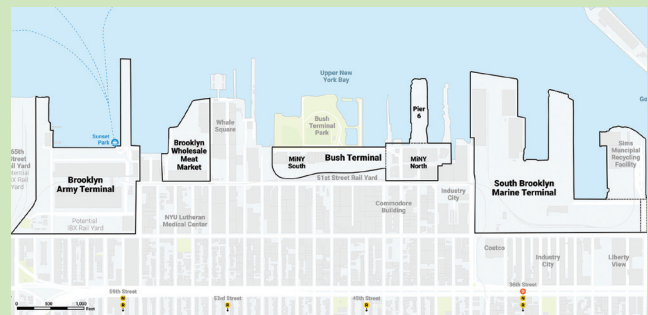
The Climate Innovation Hub (CIH) at the Brooklyn Army Terminal (BAT) further advance a growing ecosystem along the New York Harbor for new climate technologists, entrepreneurs, and talent working to develop, pilot, and deploy new solutions to combat the effects of climate change. CIH will be a world-class hub for business development, incubation, and research commercialization, serving 150 startups over 10 years and offering workforce development opportunities for the local community—working in close partnership with the Center for Climate Solutions on Governors Island and the Brooklyn Navy Yard to the north as part of the new Harbor Climate Collaborative (HCC).



Aerial view of the Brooklyn Army Terminal. Source: Albert Vecerka

NYCEDC is providing up to \$100 million of capital to support experienced, mission-aligned entities to develop and operate the CIH at BAT. CIH will develop and operate shared facilities including piloting and prototyping space and business growth programs to support climate-focused startups and incumbent businesses navigating pathways to commercialization. The Hub will also offer workforce development programming for New Yorkers, including the immediate Sunset Park community, to engage in green job training and opportunities.

BAT is a historic and modern-day industrial hub for the City—boasting 4,000 linear feet of maritime frontage and a vibrant community of more than 100 existing businesses employing over 4,000 people, including advanced manufacturers and makers. Coupled with its strategic proximity to innovation clusters along the Harbor Climate Collaborative (see page 89), BAT is an optimal location for establishing a specialized, dedicated hub for climate innovation where existing and growing businesses can locate and scale as part of a larger ecosystem.



Map of NYCEDC's Sunset Park District

BAT sits within more than 200 acres of real estate in NYCEDC's Sunset Park District along the South Brooklyn Waterfront. Stretching from the 65th Street Rail Yard and Brooklyn Army Terminal at the south, to the South Brooklyn Marine Terminal at the north, the entire district is poised to be leveraged as a testbed for supporting the piloting of climate technologies. NYCEDC's investments in the Sunset Park District, representing hundreds of millions of dollars of public and private investment will propel the Climate Innovation Hub to success, creating \$2.6 billion in economic impact and 600+ permanent jobs.

Goal 2.

Develop a Renewable Energy System

Accelerated renewable energy and storage deployments citywide and developing local supply chains to support these projects is expected to make the energy sector the third-largest driver of future green economy growth. The sector is expected to see an increase of 16,000 jobs by 2040, including approximately 5,000 additional jobs in solar and 8,000 additional jobs in offshore wind. Almost all these jobs are expected to be net new, primarily due to greater levels of investments in renewable energy and battery storage projects.

The City will continue to shape the market for key renewable energy subsectors. We will enable the development of key infrastructure required for a renewable energy transformation through direct investments, targeted incentives, and the provision of public sites and assets. We will also provide resources for local businesses and students of New York City public schools and universities that allow them to position, or reposition, themselves for jobs in these subsectors.

BUILD AND FACILITATE INVESTMENTS IN CLEAN ENERGY

16. Position industrial sites for clean energy infrastructure

NYCEDC will make 112 acres of industrial sites available for clean energy infrastructure to advance NYC's goal of 100 percent clean electricity by 2040 and New York State's Climate Leadership and Community Protection Act (CLCPA). This includes NYCEDC

investments to develop the South Brooklyn Marine Terminal (SBMT), in partnership with Equinor, into a state-of-the-art offshore wind facility. NYCEDC's investment leverages Equinor's multibillion-dollar balance sheet and up to \$126 million in NYS funding for SBMT. NYCEDC is also exploring clean energy uses at three additional industrial sites, including offshore transmission, utility-scale battery storage, scaling of solar technologies, and co-located energy innovation. As described in PowerUp and PlaNYC, the City will continue to support development and interconnection of large-scale renewable energy projects.

17. Make capital investments in the growth of offshore wind

NYCEDC is investing \$191 million over 15 years to accelerate the growth of the offshore wind subsector in NYC and support 12 GW of offshore wind production, while helping generate thousands of new jobs related to offshore wind infrastructure ranging from staging and marshaling sites to manufacturing facilities. In addition to this direct investment, NYCEDC will continue to collaborate with private site owners and other offshore wind industry stakeholders to provide strong, continued support that enables the offshore wind industry in NY to weather headwinds and delays.

18. Set nation-leading targets for offshore wind (New New York)

NYCEDC will continue to advocate to increase state-wide goals for offshore wind power generation to keep pace with California's target of 25 GW of offshore wind power by 2045, sending a strong market signal

to global companies and innovators seeking to grow their offshore wind business in NYC.

EXPAND INSTALLATION OF SOLAR INFRASTRUCTURE

19. Broaden solar on NYCEDC sites

Building on the City’s ongoing efforts to enhance solar on City-owned property such as widely installing solar on public schools and on NYCHA’s portfolio of public housing, NYCEDC will implement solar at key sites where commercially feasible. This will include the Brooklyn Army Terminal in Brooklyn, as part of its redevelopment, and the Hunts Point Produce Market in the Bronx. NYCEDC will also work with tenants undertaking major roof repairs to support investment in solar installations through improved payback periods, leveraging State and federal incentives to fulfill their Local Law 92 and Local Law 94 compliance requirements.

Incentives include federal programs providing tax credits for solar and other renewable energy projects enabled by the Inflation Reduction Act (IRA), and a series of New York State programs supporting solar implementation.

20. Enable 5,000 LMI households to install solar

In collaboration with the NYC Comptroller, the Mayor’s Office of Climate and Environmental Justice (MOCEJ) has submitted an application for the EPA’s Greenhouse Gas Reduction Fund, a federal program providing grants for clean energy and climate projects, to support solar installation across low-and-moderate income households in NYC. Pending results of the City’s GGRF application, Public Solar NYC, a commitment included in PlaNYC, will focus on using a diverse set of tools to connect a minimum of 5,000 households with the appropriate technical assistance and financial resources necessary to build and access solar savings over the next five years.



South Brooklyn Marine Terminal, which will be developed into a state-of-the-art offshore wind facility. Conceptual Rendering courtesy of Equinor.

MAKE NYC AN INDUSTRY HUB FOR CLEAN ENERGY SECTORS

21. Launch and expand energy supply chain apprenticeships

NYC Talent will partner with City agencies and the private sector to expand and create 2,000 apprenticeships and skills-based trainings in the offshore wind and hydro-electric supply chain by 2040, including for occupations such as maritime welders, machinists for component manufacturing, excavation of utilities, and energy auditors.

22. Bolster CUNY students entering offshore wind and other green industries

As outlined in PlaNYC and PowerUp, NYCEDC will support the development of offshore wind and broader green economy focused workforce, providing over \$10 million for capital investments at CUNY campuses. These investments include renovating and expanding the Kingsborough Community College Maritime Technology & Offshore Wind Training Center to accommodate increased student enrollment and enable certification for relevant offshore wind occupations. NYCEDC will utilize the existing CUNY Bridges to Offshore Wind investment and programming to ensure robust offshore wind curricula at Kingsborough Community College, LaGuardia Community College, NYC College of Technology (City Tech), and College of Staten Island. CUNY Bridges to Offshore Wind will provide an interactive instructional seminar for people interested in learning about the region's offshore wind industry and careers that are available to them in the maritime, electrical, construction & manufacturing, assembly, and supply chain subsectors, while offering the supportive services needed for individuals to succeed.

In early 2024, CUNY will launch an internal Request for Proposals to identify and solicit ideas from additional CUNY schools for capital investments to support training for students to enter the green economy workforce. NYCEDC will work with CUNY to ensure programs are industry-informed and connect students to training, apprenticeships, and career pathways in the green economy.

Finally, in partnership with NYC Public Schools, NYCEDC will also continue to host professional development days for Career and Technical Education (CTE) teachers seeking to incorporate green economy curricula into their classrooms and strengthen pathways to CUNY schools for their students.



LaGuardia offshore wind training program. Source: CUNY

SUPPORT TAX INCENTIVES FOR BATTERY STORAGE AND OTHER GREEN OUTCOMES

23. Mobilize IDA for the advancement of the green economy

NYCEDC will promote and deploy NYC Industrial Development Agency (IDA) tax incentives to support battery storage and other green economy uses. Battery storage is a critical piece of infrastructure that stores energy and ensures that power is reliable and accessible despite outages and unexpected weather conditions. The IDA helps to lower the cost of capital investment through discretionary tax incentives and is able to support certain green economy projects that align with the IDA's mission. The IDA has already supported 200MW of battery storage capacity in NYC, generating nearly \$400 million of private investment and supporting progress toward the City's target for energy storage capacity (500MW installed by 2025). This includes a 100MW 174 Power Global project in Astoria, Queens, which was awarded a contract by Con Edison under the utility's 2022 Bulk Energy Storage RFP and will be one of the biggest battery storage developments in New York State. IDA incentives may also be used to support EV freight charging, cold storage retrofits, and other green economy uses. NYCEDC will actively promote opportunities for IDA to support green economy uses to relevant actors in the green economy space to enable greater awareness of potential tax benefits.

Goal 3.

Enable Low-Carbon Alternatives in the Transportation Sector

About a quarter of the city's greenhouse gas emissions come from transportation.³⁷ The City and State have long been committed to strengthening public infrastructure systems that promote transit use, walking, and cycling. There has been significant progress in electrifying the City-owned fleet and public transit. As of 2022, DCAS replaced 4,000 fleet vehicles with EVs, and hundreds of additional fleet vehicles are set to be replaced in the coming years.³⁸ In addition, MTA plans to transform the entire bus fleet to zero-emissions buses by 2040.³⁹

The green economy has also introduced new types of transportation sector jobs, which are projected to nearly quadruple between 2021 and 2040, largely due to the growth of electric vehicles. Government intervention will need to play a large role to drive this growth, particularly in the face of infrastructure needs, regulatory hurdles, and challenging market dynamics. The City will mobilize strategic sites and assets for electric vehicles of various modes, provide funding support for pioneering companies moving to sustainable distribution methods, and ensure there are clear pathways to public sector jobs in clean transportation.

EXPAND EV CHARGING INFRASTRUCTURE

24. Activate public sites for EV charging

Starting in 2024, EV charging infrastructure will be required at all NYCEDC assets and in solicitations for all future NYCEDC redevelopments where feasible. NYCEDC has begun implementing this in real estate transactions and asset-based procurements. This includes the sale of two acres near JFK airport, which

has been designated to a developer with a track record investing in the JFK market and in EV charging. The development of this site will deliver the largest 100 percent EV Ready charging facility in New York City with a minimum of 65 public EV charging stations, including 12 DC Fast Charging Stations, that are available 24 hours a day and seven days a week. The facility is currently estimated to charge 1,000 vehicles per year, with potential for growth depending on market demand. The EV chargers are expected to serve all types of vehicles, with focus on the electric truck market as it matures, and help avoid nearly 78,000 metric tons of carbon dioxide emissions by 2040. Electrical conduits will also be installed throughout the site, to allow for additional charging stations to be added over time as demand grows.

NYCEDC will also identify other underutilized public sites to activate as dedicated EV charging hubs. As a first step, NYCEDC has secured \$15 million in federal grant funding to develop a multi-user passenger and freight hub in the Hunts Point Food Distribution Center and is issuing an RFP to select a developer and operator. This hub will be strategically sited to support electric truck adoption, as over 10,000 trucks move through the Hunts Point peninsula on a typical day. NYCEDC is further identifying underutilized public sites across the city that could be activated for freight and/or passenger charging, and is working toward an RFP to assess the market interest in these sites in 2024. These efforts build on the City's commitments outlined in PlaNYC such as significantly expanding EV charging citywide by 2035, and supporting electric vehicle adoption of taxis and for-hire vehicles.

25. Create hubs for infrastructure and innovation at Brooklyn Navy Yard

The BNYDC is advancing a series of improvements that support infrastructure access and innovation in clean transportation and micromobility. These investments are anchored by Electric Curbside, a multimodal EV charging and piloting hub that will be open to EV cyclists, drivers, and delivery workforce by late 2024. One-point trenching will enable startups to pilot and demo EV auto and micromobility charging, with additional potential for battery-swapping kiosks. The Electric Alley initiative, a series of pre-entrenched and grid connected parking spaces, will further support testing and demoing of EV technologies. BNYDC will also work with vendors to install and operate 80 Level II and Level III electric vehicle chargers across the Yard, which will be available to the public, fleets, and Yard tenants. The first chargers in this EV Charger Station Network are expected to be operational by summer 2024.

26. Launch EV operation and technician apprenticeships

NYC Talent will partner with City agencies and the private sector to develop skills-based training programs to train 2,000 New Yorkers to operate and maintain emerging electrifying fleets by 2040. New partnerships are currently under development with educational and training partners and the private sector for vehicle technician trainings, while EV operation modules are being embedded into commercial drivers' license training programs.

27. Electrify all City school buses and stand up maintenance training programs

PlaNYC PowerUp

As mentioned in PlaNYC and PowerUp, the City committed to electrifying school buses by 2035. As part of the effort the City will expand workforce opportunities and train school bus operators and maintenance staff to participate in the EV transition. Training programs will address driving considerations and basic vehicle and charger maintenance as well as the complexities of managing charging to meet route needs with minimal costs. As the use of vehicle-to-grid (V2G) systems—where energy can be pushed back to the power grid from the battery of an electric vehicle—progresses from pilots to broader implementation, training will also cover these operations.

DECARBONIZE MARITIME TRAFFIC

28. Install and mandate use of shore power at all cruise terminals

Cruise ship idling creates significant emissions and pollution in surrounding communities. NYCEDC is committed to reducing emissions from cruise ships, including by mandating the development and use of shore power infrastructureⁱ at Manhattan and Brooklyn NYC

ⁱ Shore power, or shoreside electrical power, can be plugged in to power docked ships



Cruise ship docked in Manhattan Source: C. Taylor Crothers/NYCEDC



Mayor Eric Adams, Deputy Mayor Maria Torres Springer, and NYCEDC President and CEO Andrew Kimball announce the aim to become the first heliport in the world with the infrastructure to support electric flight with demonstration flights of various electric aircraft. Source: Michael Appleton/Mayoral Photography Office, NYC Mayor's Office

Cruise terminals by 2028, as feasible. Shore power is electrical charging that can power ships while they are docked at the terminals, and is expected to reduce carbon and particulate matter 2.5 (PM2.5) emissions from idling cruise ships by 6,582 metric tons of carbon dioxide equivalent (CO₂e) and 1.592 metric tons of PM2.5 respectively.

29. Electrify the Governors Island ferry

New York City's first public, hybrid-electric ferry is scheduled to begin service between Lower Manhattan and Governors Island in the summer of 2024. The vessel's rapid charging infrastructure, made possible by \$7.5 million of Federal Infrastructure Funding, will enable the ferry to operate with zero emission, battery-only propulsion, which will drop emissions to nearly zero, avoiding 800 tons of CO₂ emissions annually.

30. Spearhead the adoption of electric aircraft at NYC heliports

Electric aircraft, including electric vertical take-off and landing (eVTOL) aircraft, are an emerging technology nearing Federal Aviation Administration (FAA) certification that can mitigate the emissions associated with certain helicopter trips and alleviate noise pollution near the city's heliports. Once commercially viable, these electric aircraft could also underpin a

broader green industry in sustainable aviation. Original equipment manufacturers in this emerging space have already raised over \$8 billion and booked over 12,000 aircraft orders to date. Flight testing and manufacturing facility development is ongoing with FAA certification anticipated by mid-decade.

NYCEDC is requiring the Downtown Manhattan and East 34th Street heliports to build out charging infrastructure for these quieter and cleaner electric aircraft within one year of FAA certification. Heliport operators will also be required to provide incentives for eVTOL flights. New M/WBE participation goals are required in ongoing and future procurements, alongside workforce development plans that improve and diversify access to careers in aviation, logistics, and other related sectors.

ENABLE AND RETAIN SUSTAINABLE FREIGHT JOBS AND SERVICES

31. Implement a marine highway for freight transport

NYCEDC will deliver six landing sites where vessels will bring freight to distribution hubs for last-mile delivery reducing truck moves. DOT, supported by NYCEDC, released a Request for Expression of Interest (RFEI) to

gauge current industry interest in maritime freight to inform future activations and interventions for private vessel operators to provide marine highway service.

32. Support maritime logistics businesses

NYCEDC seeks to provide a long-term lease to Miller's Launch, a North Shore Staten Island-based company that provides barge-based transportation for a variety of goods and services, and employs close to 100 people, many of whom are Staten Islanders. Miller's Launch is known as the "Swiss Army Knife" of NY Harbor, and with their fleet of 39 vessels and 14 barges, this NY-family-owned-and-operated business provides a variety of services on NY Harbor. They are active in providing emergency pollution response, offshore wind, and waterfront construction services. Over the years, they have played a critical logistics role diverting construction vehicles from NYC streets via providing roll-on roll-off truck-to-barge transportation solutions (e.g., bringing construction vehicles to and from Cornell Tech on Roosevelt Island and Governors Island while avoiding local neighboring streets).

Providing a long-term lease to Miller's Launch ensures NY Harbor will continue to have a wide array of small and medium local marine service providers, while also providing public waterfront access. Small businesses like Miller's Launch are critical for having the local and technical capacity to realize the City and State climate and resilience goals.

33. Accelerate adoption of cargo bikes (PlaNYC)

As described in PlaNYC, the City will promote commercial cargo bikes as cleaner and more efficient technologies for last-mile deliveries. In 2022, cargo bikes made more than 130,000 trips delivering over 5 million packages, resulting in the reduction of over 650,000 metric tons of CO₂ emissions, and demonstrating their effectiveness as a last-mile delivery mode. The program's success indicates a growing demand for sustainable freight solutions in urban areas, and as a result DOT will seek federal funding to expand the program and work with the City and State legislative partners to remove barriers to deployment of commercial cargo e-bikes. As outlined in PlaNYC, these efforts will help reach a goal of growing participation in the program from 350 bikes in 2020 to 2,500 bikes by 2026.

34. Bolster New York City's Clean Trucks Program (NYCCTP) (PowerUp)

NYCCTP aims to reduce emissions from trucks in NYC, prioritizing the deployment of zero-emission battery electric replacement trucks, while also offering

incentives for the deployment of non-electric alternative fuel and diesel replacement trucks. DOT is directing approximately \$10 million of its NYS-DEC/VW Diesel Settlement funding award as well as \$20 million in funding from MTA's Central Business District Tolling Program (CBDTP) to expand the program to industrial business zones citywide, offering incentives for companies that switch to new battery electric, EPA emission-compliant alternative fuel (compressed natural gas, diesel-electric hybrid, and plug-in hybrid electric), or diesel trucks. DOT aims to cover as many as another 1,000 trucks by 2030 and will seek federal funding opportunities to further scale the program. As an additional investment in air quality made through the CBDTP, MTA has also allocated \$15 million for DOT's Truck Refrigeration Unit (TRU) Replacement Program, which will fund the scrappage and upgrading of high-emission auxiliary power units used for food refrigeration at the Hunts Point markets.

FACILITATE DEMAND FOR PASSENGER MICROMOBILITY

35. Advance SAFEMicromobility for public housing (Clean Safe, Ride Safe Action Plan)

NYCHA is launching its SAFEMicromobility program after being awarded USDOT's RAISE grant. This will install 173 charging and storage stations for micromobility devices at 53 NYCHA developments. NYCHA and Con Edison will start by installing outdoor charging and storage stations at four developments, Queensbridge North and South (Queens), De Hostos (Manhattan), and Van Dyke (Brooklyn).

INDUSTRY EXPOSURE TO SUPPORT WORKFORCE PIPELINES

36. Develop the Building Pathways MTA Electrical Pre-Apprenticeship program

A federal grant will be used to create an electrical pre-apprenticeship workforce development program for 50 out-of-school young adults to receive training, qualifying them for direct recruitment to employment with the MTA as Transit Electrical Helpers. Training will initially focus on work readiness and soft skills with an individualized support services strategy through case management to offer participants wraparound support and social services needed to stay engaged with the program.

Goal 4.

Catalyze Innovation in Climate Technologies

As of 2022, the NYC Metropolitan Area is the third largest climate tech ecosystem in the world, with 179 active climate tech companies and VC investments reaching almost \$4 billion in 2021. New York can and will continue to be a leader in this space.

The City's role has been, and will continue to be, an enabler for transformative technologies to develop and thrive. We will create opportunities to test, demonstrate, scale, and commercialize new innovations and technologies; incubate and attract future climate tech unicorns; and ensure the regulatory environment supports common sense measures to implement climate solutions in our built environment.

DEVELOP NYC'S HARBOR CLIMATE COLLABORATIVE

37. Activate the Harbor Climate Collaborative

NYCEDC, Brooklyn Navy Yard Development Corporation (BNYDC), and Trust for Governors Island, working in close collaboration with the Deputy Mayor for Housing, Workforce, and Economic Development, and NYC Talent are partnering as the "Harbor Climate Collaborative." The Collaborative will be dedicated to coordinating piloting and tenant opportunities to serve green economy entrepreneurs and businesses, advancing climate innovation and research, and providing workforce training for in-demand, good-paying green economy jobs. With over \$725 million in public investments for the green economy at NYCEDC's Sunset Park District, the Brooklyn Navy Yard, and on Governors Island, the partnering institutions will

support climate innovators through piloting, tenanting, regulatory coordination, workforce development, knowledge/data sharing, fundraising, and facilitating access to City agencies. These three institutions are collectively activating six million square feet of space for innovation, supporting 5,000 permanent jobs, enabling the education and training of 2,100 students, and generating \$55 billion of economic impact.

These institutions will anchor a Pilot Network for climate innovation, offering a network of incubators and accelerators and dedicated pilot locations to streamline a point-of-entry for NYC-based companies to pilot their climate technology solutions. In its first year, the City will support 20+ climate technology pilots across Harbor of the Future sites and enable challenge-based procurements that base awards for procurement of NYC goods and services on the success of these pilots.

In addition, the Workforce1 Industrial Transportation Center at the Brooklyn Army Terminal has served as an anchor of a citywide network of workforce centers that has helped New Yorkers prepare for and connect to focus occupations in the green economy. The Workforce1 System will continue to partner with businesses, including those created by new and transitioning companies across the Climate Collaborative, to connect New Yorkers to thousands of job opportunities that will exist in the green economy by 2040.

38. Develop a world-class Climate Innovation Hub at Brooklyn Army Terminal

NYCEDC will release an up to \$100 million request for proposals (RFP) for an operator to develop a world-class Climate Innovation Hub (the Hub) at the Brooklyn Army Terminal (BAT). This Hub will accelerate

commercialization pathways for climate tech startups and incumbent businesses, especially those developing hardware solutions, while catalyzing the transformation and tenancing of an additional space coming online at BAT. The RFP will seek an operator to develop and operate the Hub. The operator will work with tenants to build and rapidly prototype products, using the fit-for-purpose space to provide business support and carry out product research and development. They will also provide workforce programming, especially for the local Sunset Park community, to upskill people through green job training and opportunities. The Hub will also support piloting climate technologies building on the recently launched “Pilots at BAT” program—an effort committed to demonstrate climate technologies and solutions at this historic industrial site.

Altogether, NYCEDC’s \$100 million investment will catalyze climate innovation that will create over 600 permanent jobs and \$2.6 billion in economic impact.

39. Complete the 400k-SF New York Climate Exchange on Governors Island (PlaNYC)

In April 2023, following a two-year competitive process, Mayor Eric Adams and the Trust for Governors Island announced that the New York Climate Exchange will serve as the anchor educational and research institution of the Center for Climate Solutions. Led by Stony Brook University, the New York Climate Exchange consortium includes 15 members representing leading universities from around the world, as well as business and nonprofit organizations dedicated to developing and deploying solutions to the global climate crisis. The Exchange will be a global hub that leverages education, research, and programming to function as an open, living laboratory for climate solutions and support communities in the battle against climate change. Phase 1 of the project, which includes 400,000 square feet of state-of-the-art facilities, will open in 2028.

ENCOURAGE COMMERCIALIZATION OF GREEN TECHNOLOGY

40. Catalyze sustainability-focused bio-technology and materials innovation (PlaNYC)

As outlined in PlaNYC, NYCEDC will continue to advance a Materials Innovation Hub to drive biomaterial innovation for NYC’s key industries, including construction, fashion, and medicine, and advance the City’s carbon neutral goals.

41. Develop an effective regulatory process to promote climate innovation

NYCEDC will partner with the Fire Department of the City of NY (FDNY) and DOB to develop an effective regulatory process—including streamlining and coordinating agency reviews—to promote climate innovation and navigate a path forward to meet the City’s carbon reduction goals. To support the City’s PowerUp commitment to reduce battery storage permitting timelines by 50 percent, FDNY will advise on the next iteration of NYCEDC’s Resilient Energy Studio, a program that pilots cutting-edge energy storage technologies in NYC. To support the City’s goal to reduce embodied carbon in construction for City projects 50 percent by 2033 and transition from concrete and steel to more sustainable building material alternatives, DOB and FDNY will work with the NYC Mass Timber Studio to explore the potential of mass timber projects in NYC. DOB is also partnering with the Trust for Governors Island to unlock the potential of mass timber at the New York Climate Exchange, which will be a 400k-square-foot campus dedicated to research, education, and public programs addressing the climate crisis beginning construction in 2025.

42. Launch Greenlight Innovation Fund

NYCEDC launched a \$50 million+ City capital RFP to support nonprofits and nonprofit joint ventures that focus on translating innovation to commercialization with a focus on opportunities within the green economy, as well as in life sciences and other advanced technologies. The fund supports the creation of space, placement of specialized equipment, development of talent, and catalyzation of industry ecosystems and prioritizes support for diverse entrepreneurs and minority-owned businesses.

43. Update outdated land use rules with City of Yes for carbon neutrality (PlaNYC)

Adopted in December 2023, the City of Yes for Carbon Neutrality updates outdated regulations creating barriers for climate action across green energy, buildings, transportation, water, and waste systems. The zoning text amendment includes 17 policies that will open up over 8,500 acres of parking lots across the city for potential use of solar panels, facilitate the retrofitting of over 50,000 buildings, enable EV charging in more than 400 million additional square feet and help divert 34 percent of the City’s residential waste to beneficial use, among other things.

THE HARBOR CLIMATE COLLABORATIVE

A new global partnership for climate research, commercialization, and workforce development along the New York Harbor

The Harbor Climate Collaborative is a joint initiative between three mission-aligned public entities with sites along the New York Harbor—the Trust for Governors Island (TGI), New York City Economic Development Corporation (NYCEDC) and Brooklyn Navy Yard Development Corporation (BNYDC) – working in close collaboration with the Deputy Mayor for Housing, Workforce, and Economic Development and NYC Talent. Connected by the NYC Ferry across Governors Island, the Brooklyn Navy Yard, and NYCEDC’s Sunset Park District—the Collaborative will be the center of a burgeoning climate innovation ecosystem in New York City. It will be dedicated to coordinating piloting and tenant opportunities to serve green economy entrepreneurs and businesses, advancing climate innovation and research, and providing workforce training for in demand, good-paying green economy jobs. The Collaborative will leverage each of the partner’s expertise in research and climate education, business support for emerging companies and solutions, preparing New Yorkers for well-paying jobs, and to provide a home for new and existing businesses to scale in New York City’s growing green economy.

THE HARBOR CLIMATE COLLABORATIVE REPRESENTS A COLLECTIVE \$725 MILLION TO BUILD A GREEN ECONOMY ECOSYSTEM ACROSS 6 MILLION SF AND 72 ACRES. IT WILL SUPPORT 5,000 NEW PERMANENT JOBS AND GENERATE \$55 BILLION IN ECONOMIC IMPACT.

The City’s investment will allow the Collaborative to create space for the most critical activities driving New York’s green economy, including shared piloting and tenanting opportunities, business and workforce



Planned NY Climate Exchange at Governors Island. Conceptual Rendering by Skidmore, Owings & Merrill.

development programs, and fundraising support for climate innovators.

Some of the main activities of the Collaborative include:

Research, education, and global convening at the NY Climate Exchange. The Exchange, a consortium anchored by Stony Brook University with over 45 partner organizations, will be a global hub that leverages the collective power of education, research, workforce development, policy development, and public programming, while supporting communities in the battle against climate challenges and connecting New Yorkers to opportunities in the green economy. By 2028, the Exchange will open its marquee, 400k-square-foot campus serving approximately 500 post-secondary students a yearⁱⁱ.



Future Climate Innovation Hub at Brooklyn Army Terminal. Conceptual Rendering by FXCollaborative

Infrastructure and opportunities to pilot and scale climate technologies through the Pilots at BAT program at the Brooklyn Army Terminal, Yard Labs at Brooklyn Navy Yard, and the Governors Island Living Lab, with additional purpose-built infrastructure at the Climate Innovation Hub at Brooklyn Army Terminalⁱⁱⁱ. The Collaborative will work with relevant government



Planned net-zero vertical industrial building at Brooklyn Navy Yard. Conceptual Rendering by WXY Studio

agencies to facilitate regulatory change and provide access to municipal procurement opportunities.

Accelerator support for climate startups with dedicated prototyping and step out space complemented by accelerator programming across all three locations. These facilities will be managed through partners like Newlab at BNY, forthcoming Buttermilk Labs at Governors Island, and the Tech Incubator at the New York Climate Exchange. An accelerator operator will be selected for the forthcoming Climate Innovation Hub at the Brooklyn Army Terminalⁱⁱⁱ.

Home for new and existing green economy businesses. In addition to the existing 10 million square feet of real estate across NYCEDC's Sunset Park District (4 million) and the Brooklyn Navy Yard (6 million), the Collaborative is adding new space to serve both established and growing businesses in the green economy. Planned expansion includes 1 million square feet of advanced manufacturing space coming online in Sunset Park and 5 million square feet of new space at the Brooklyn Navy Yard, starting with ~700,000 square feet in NYC's first net-zero emissions vertical modern industrial building.

THE MEMBERS

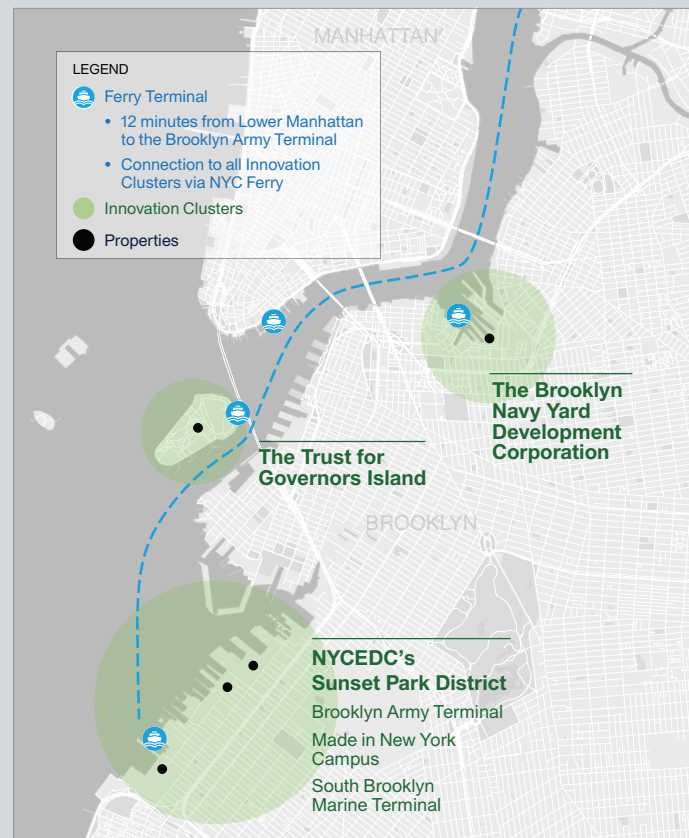
Three mission-aligned public entities with a strong history of catalyzing public-private partnerships will develop sites along the East River to serve as the home of the Collaborative:

The Brooklyn Navy Yard Development Corporation (BNYDC) develops and manages the Brooklyn Navy Yard, a mission-driven, 300-acre waterfront industrial park that emphasizes growing entrepreneurship among historically underrepresented demographics and emerging industries. The Brooklyn Navy Yard (BNY) has been redeveloped as a dynamic campus that is home to a growing cluster of climate tech businesses, and has more than 550 businesses which employ more than 11,000 people today.

The Trust for Governors Island (TGI) is responsible for the planning, operations and development of Governors Island, a 172-acre former military base that has been transformed as a unique public destination for New Yorkers. As part of the Center for Climate Solutions, the island will soon be home to the New York Climate Exchange. It will function as a global hub for education, research, and training to grow green jobs for New Yorkers.

New York City Economic Development Corporation (NYCEDC)'s Sunset Park District is an emerging hub for industry and climate innovation. Composed of the Brooklyn Army Terminal (BAT), the South Brooklyn Marine Terminal (SBMT), and the Made in New York (MiNY) campus, the District is home to more than 150 businesses employing more than 4,000 people today across 5 million square feet of space. As part of the

City's investment in the Green Economy, NYCEDC is redeveloping SBMT into a world-class offshore wind hub and activating space for established, growing, and startup stage industrial businesses including 300,000 square feet at BAT and 700,000 square feet at MiNY over the next 10 years. The planned redevelopment will center around the forthcoming Climate Innovation Hub at BATⁱⁱⁱ.



ⁱ Please refer to "The Center for Climate Solutions at Governors Island" on p.92

ⁱⁱ The consortium consists of Core Partners (Stony Brook University, BCG, Georgia Tech, GOLES, Pratt Institute, Pace University, University of Washington), Affiliate Partners (City University of New York, Duke University, Moody's Corporation, New York University, SUNY Maritime College, University of Oxford) with additional partnerships with dozens of community, environmental justice, research and business partners

ⁱⁱⁱ Please refer to "The Climate Innovation Hub" on p.92

TALENT AND WORKFORCE AT HARBOR CLIMATE COLLABORATIVE

Connecting economically disadvantaged communities to career opportunities and developing a diverse, robust workforce are key priorities of the Harbor Climate Collaborative. Key initiatives include:

- **Brooklyn STEAM Center**, a DOE-operated innovative career and technical training hub located at the Brooklyn Navy Yard, connected to eight local high schools and serving local students, will be expanded to serve 700 students by 2025.
- **The industrial “Jobs of the Future” training center**, opening at the Brooklyn Navy Yard in 2026, will provide hands-on training opportunities in building sustainability, maritime vessel operations, and e-mobility tech such as electric bikes, cars, and trucks.
- **New York Climate Exchange** on Governors Island will host a wide range of workforce development and training programs for careers in the green economy, working in partnership with New York City community-based organizations.
- **The New York Urban Assembly Harbor School**, a public high school offering a unique Career Technical Education curriculum focused on environmental, water, and maritime careers will open two new facilities on Governors Island by 2027, hosting state-of-the-art laboratory and aquatic facilities, and doubling its student body to approximately 1,000 students.
- **Workforce1 Industrial Transportation Center** at Brooklyn Army Terminal has served as an anchor of a citywide network of workforce centers that has helped New Yorkers prepare for and connect to the Focus Occupations identified in the *Green Economy Action Plan*, and will continue to partner with businesses to connect New Yorkers to thousands of job opportunities in the green economy.

→ **Climate Innovation Hub**, a forthcoming hub for green economy business incubation, commercialization, and growth will have dedicated space and programming for workforce development, with a particular focus for the local Sunset Park community.



Brooklyn STEAM Center at the Brooklyn Navy Yard



Brooklyn STEAM Center at the Brooklyn Navy Yard

THE CENTER FOR CLIMATE SOLUTIONS AT GOVERNORS ISLAND

A groundbreaking initiative for developing urban climate solutions and supporting New Yorkers in climate and environmental fields.



Rendered aerial view of the Exchange's climate campus

In Fall 2020, the City announced the Center for Climate Solutions at Governors Island, which will be a global hub that leverages that collective power of education, research, workforce development, policy development, and public programming to support global communities in the battle against climate change. The project will build on an existing community of climate-focused tenants working on Governors Island including the Urban Assembly Harbor School, Billion Oyster Project, Buttermilk Labs, Grow-NYC, and more. Projects announced to date include:

The New York Climate Exchange

A 15-member cross-sector consortium anchored by Stony Brook University, the Exchange¹ will create a state-of-the-art, \$700 million, 400k-square-foot campus on Governors Island dedicated to researching and developing innovative climate solutions that will function as a global hub for education, research, and training to grow green jobs for New Yorkers. The Exchange will serve as an open, living laboratory where experts convene to test climate solutions in a mix of newly constructed academic and research space and in restored historic buildings, all designed with the latest sustainability principles in mind. The Exchange will establish NYC as the global epicenter for tangible solutions that give cities, countries, and other stakeholders internationally a playbook for mitigating and adapting to climate change.

The consortium includes over 45 partner organizations representing leading universities, businesses, and nonprofit organizations dedicated to developing and deploying solutions to the global climate crisis. The Exchange was selected and announced in April 2023 following

a two-year competitive process seeking an anchor educational and research institution for the Center for Climate Solutions.

In the Phase 1 plan, which is scheduled to open in 2028, the Exchange will:

- Showcase sustainable building practices in two newly constructed academic and research space in the island's Eastern Development Zone
- Restore over 170,000 square feet of space within historic buildings, including Liggett Hall and the Fort Jay Theater
- Include 4.5 acres of new open space, adding to the Island's existing 120 acres of open space across the Historic District and South Island Park

The Living Lab

Governors Island is itself an experiment in creating resilient coastal landscapes, with a new 43-acre park designed to address projected sea-level rise and dozens of educational and cultural partners engaging in these issues including the Billion Oyster Project, Earth Matter NY, NYC Audubon, GrowNYC, and more.

The Trust for Governors Island's Living Lab, announced in 2023, leverages these unique resources to provide a formal platform for research, partnerships, and programs to amplify climate action through the following components:

- An annual climate solutions challenge open to nonprofits, entrepreneurs, small businesses, and startups seeking to test and demonstrate climate solutions on the Island
- A climate-focused field trip curriculum for New York City students
- A climate community convening space on the island

By moving experimentation out from behind closed doors, the Living Lab provides opportunities for nonprofits, environmental justice organizations, entrepreneurs, and small businesses to conduct real-world research, pilot innovative responses to pressing resiliency challenges, and engage New Yorkers of all backgrounds in their work—an exciting example of what resilient and sustainable urban development can mean for cities.

¹ Exchange Partners include Stony Brook University, BCG, IBM, Georgia Tech, University of Washington, Pace University, Pratt Institute, Good Old Lower East Side, Duke University, New York University, University of Oxford, Rochester Institute of Technology, SUNY Maritime College, The City University of New York, Moody's, Brookhaven National Laboratory, Urbs plus over 30 community, workforce, and industry partners.

Goal 5.

Ensure an Equitable Green Economy Ecosystem

The growth of the green economy will depend not only on the innovation and deployment of lower-emission solutions and technologies, but on the development and activation of an entire ecosystem that can manufacture, supply, distribute, and install these solutions. This includes local manufacturers in climate tech supply chains, local construction firms, and suppliers to support building decarbonization retrofits and more.

The City is committed to supporting small and medium—and M/WBE—local businesses across sectors to grow, expand, and transition their work. We will make investments in workforce programs and facilities, provide direct technical assistance to local businesses, and advance large-scale projects that both are critical to the city’s resilience to climate impacts and promote the mobilization of existing businesses and workforce for green outcomes.

INVEST IN GREEN TALENT

44. Connect young New Yorkers with practical learning and training opportunities in the green economy

NYC Talent will work with partners to position NYC’s young people for success in the green economy through increased career-connected learning, trainings, preparation, internships, and apprenticeships for students and young people across NYC Public

Schools (NYC PS), CUNY, and the NYC Department of Youth and Community Development (DYCD), in keeping with the City’s new action plan.

45. Ensure 5-10% of Talent Investment Fund supports the green economy workforce development

NYC Talent will set a goal for 5–10 percent of investments made through the Talent Investment Fund, which pools public and private funders to jointly invest in promising program models and services, to be supportive to the green economy. The investments will be distributed to programs that connect New Yorkers to occupations that are unique and critical to the green economy and will ensure that 30 percent of all individuals served by the Fund come from Environmental Justice neighborhoods.

46. Enhance Workforce1 Career Centers for the green economy

The Workforce1 Industrial Transportation Center at the Brooklyn Army Terminal has served as an anchor of a citywide network of workforce centers that has helped New Yorkers prepare for and connect to focus occupations in the green economy. The Workforce1 System will continue to partner with businesses, including those created by new and transitioning companies across the Harbor Climate Collaborative, to connect New Yorkers to thousands of job opportunities that will exist in the green economy by 2040.

47. Provide grants to small businesses for green workforce training

SBS will leverage the Customized Training Grants Program to support businesses in training their incumbent workforces in their transition to adopt new green and energy efficient equipment and technologies to ensure business resilience and equitable workforce continuity.

48. Build Solar One Environmental Education Center

NYCEDC, Empire State Development (ESD), and Solar One, a leading sustainable energy nonprofit, broke ground on the Solar One Environmental Education Center in 2023, which will train the next generation of environmental leaders. It will consist of a two-story learning center allowing Solar One to expand its climate education, including afterschool and summer camp programs, as well as event and community space.

CULTIVATE A LOCAL OFFSHORE WIND SUPPLY CHAIN

49. Provide technical assistance to manufacturers to build a local offshore wind supply chain

NYCEDC will launch an industry network and technical assistance program to help local manufacturers and other industrial businesses plug into the emerging multibillion-dollar offshore wind supply chain. The technical assistance program will help develop local manufacturing businesses to capture economic opportunities in the regional offshore wind supply chain, with concerted recruitment efforts around M/WBE participation. In spring 2023, NYCEDC engaged 200 industrial businesses (including manufacturers, construction service providers, and equipment



Groundbreaking event for an environmental education center with SolarOne, NYCEDC, and ESD. Source: NYCEDC

suppliers) through a survey to understand their interest in and positioning for pursuing business opportunities in offshore wind—and ultimately identify a pipeline of existing businesses that could enter the offshore wind sector. These businesses will continue to be a basis of outreach for the forthcoming programming.

50. Turn West Shore of Staten Island into a hub for clean energy related jobs

NYCEDC will continue to develop Staten Island’s West Shore as a hub for clean energy and green manufacturing jobs that are good and accessible to local communities. The City continues to support the transformation of the Rossville Municipal Site, a 33-acre City-owned waterfront industrial property on the West Shore of Staten Island, into a state-of-the-art facility for industrial uses in the green economy.

BUILD CONNECTIONS BETWEEN INDUSTRY AND TALENT

51. Establish green training facilities in all five boroughs

NYC Talent will work with public, private, and educational partners to develop green economy training facilities, with a goal of having a training facility in each borough by 2030. NYC Talent will pilot this model through collaboration with the Trust for Governors Island and the New York Climate Exchange on training models focused on building and construction, beginning in 2025, with a goal of serving 100 trainees per year in early-phase programs. These programs will inform the long-term workforce development programming that will be located on-site at the Exchange’s future, permanent facilities and serve as a model for future programs supported by NYC Talent citywide.

52. Expand and connect industry partnerships to inform green workforce priorities

NYC Talent will first lead workforce discussions the City’s Green Advisory Council, and subsequently leverage the LL97 Mobilization Council’s workforce task force and NYC Talent Industry Partnership employers to implement identified talent development and upskilling efforts.

ADVANCE CRITICAL COASTAL RESILIENCE PROJECTS

53. Advance Lower Manhattan Coastal Resilience Project (PlaNYC)

Through the Lower Manhattan Coastal Resiliency Project, the City seeks to protect Lower Manhattan from inundation by rising sea levels and coastal storms. Through building flood protection at The Battery, advancing design of Seaport Coastal Resilience, and implementing the Financial District and Seaport Climate Resilience Plan, the City will help to ensure the area’s continuity in serving residents, workers, visitors, and commuters who rely heavily on its transit network and want to remain in their dynamic neighborhoods. Through robust M/WBE commitments, these projects are also creating workforce opportunities for New Yorkers in the green economy while advancing innovative practices.

The Battery Coastal Resilience project, for example, served as a model for the forthcoming NYCEDC Circular Construction Guidelines with an emphasis on materials reused, stored, and refurbished on-site and is anticipated to obtain Envision Platinum. The project is funded fully with city capital funds and targets nearly \$40 million in M/WBE opportunity.

54. Advance the Raise Shorelines Initiative at Travis Avenue and Old Howard Beach

The Travis Ave. Project will reconstruct a low-lying and frequently flooded section of Travis Avenue within Richmond County, Staten Island. The roadway will be raised on either side of a bridge over the Fresh Kills Main Creek to mitigate against tidal overtopping due to sea-level rise at the projected 2050 elevation. New eco-passages (which help wildlife safely cross) and culverts (which enable water conveyance) will also be installed to enhance hydraulic and ecological wetland connectivity. The Old Howard Beach project within Queens addresses two low-lying and exposed street ends facing the NYC shoreline at 95th Street and 165th Avenue. The roadway will be raised, crown walls will be installed, and new stormwater drainage improvements within both streets will mitigate against tidal flooding at the projected 2050 sea-level rise elevation. Design for both projects is funded through Community Development Block Grant Funds for Disaster Recovery (CDBG-DR Funds) from the U.S. Department of Housing and Urban Development (HUD). The projects are currently in construction.



Rendering of vision proposed by Financial District and Seaport Climate Resilience Plan, along the East River in Lower Manhattan. Conceptual Rendering by Arcadis

55. Expand Saw Mill Creek Pilot Wetland Mitigation Bank

NYCEDC is implementing NYC’s first tidal wetland mitigation bank under its MARSHES initiative (Mitigation and Restoration Strategies for Habitat and Ecological Sustainability). The project will restore up to 80 acres of degraded wetlands on the West Shore of Staten Island by removing historic fill, planting new vegetation, removing invasive species, and re-establishing habitat and ecological function. The project creates mitigation “credits” that serve as offsets to waterfront infrastructure projects in NYC, in accordance with federal and State regulations. By leveraging funds from the sale of credits, mitigation banking results in a large-scale, protected ecological restoration project while also helping waterfront infrastructure projects get permitted. As of December 2023, the project has restored and is generating credits from 54 acres of wetlands.

56. Develop Brooklyn Bridge Montgomery Coastal Resilience

The Department of Design and Construction (DDC) will install a combination of flood walls and deployable flip-up barriers to protect the Two Bridges

neighborhood from storm surge while maintaining access and visibility to the waterfront. The project will extend along the waterfront from the Brooklyn Bridge to Montgomery Street and will reduce flooding risk—from both sea-level rise and storm surge—for thousands of residents, while continuing to preserve views and access to the waterfront. The location of the flood walls and posts has been designed to minimize conflict with subsurface infrastructure and to maximize integration of public space amenities such as open-air seating, fitness equipment, and athletic courts. BMCR is a fully funded project with \$350 million in City capital funding and an additional \$172 million in federal funding and is expected to be completed in the summer of 2025.

57. Invest in Cloudburst Resiliency Projects [\(PlaNYC\)](#)

Supported with nearly \$400 million in capital funds, these specially designed, built, and engineered infrastructure projects will protect residents and property in four new areas, Corona and Kissena Park, Queens; Parkchester, Bronx; and East New York, Brooklyn. The Cloudburst program clusters construction of stormwater management projects in flood-prone communities to better prepare residents and property for intense

rain fall events like Hurricane Ida. Cloudburst has already begun work in two neighborhoods: South Jamaica and St. Albans, Queens.

SUPPORT NEW AND TRANSITIONING BUSINESSES ACROSS ALL GREEN ECONOMY SECTORS

58. Invest \$40M to seed the NYC Catalyst Fund

Through the NYC Catalyst Fund, NYCEDC will invest in opportunities that prioritize diverse entrepreneurship, community development, and high-growth emerging sectors including the green economy. The goal of the program is to make investments that generate financial return as well as positive, measurable, social and environmental impact.

59. Build capacity and prioritize diverse businesses for City construction PlaNYC

NYCEDC will continue investing in ConstructNYC, a capacity-building program connecting small-to-mid-sized M/WBE businesses with opportunities to work on NYCEDC projects to achieve at least 30 percent M/WBE participation in all procurements. ConstructNYC is growing the number of contractors equipped to support the green economy through specialized training for sustainable construction. ConstructNYC prequalifies trade contractors and assists in reducing industry barriers by providing training, technical assistance, and directly connecting participants to NYCEDC projects.

60. Leverage Waterfront Pathways Program to expand access to green economy opportunities

The Offshore Wind (OSW) NYC Waterfront Pathways Program, launched by NYCEDC in 2023, exists to counter documented disparities in public procurement by increasing opportunities for M/WBEs in the offshore wind and waterfront industries. NYCEDC will continue and seek to expand this program to enable more M/WBE firms enter this emerging green subsector.

61. Establish green loans through Emerging Developer Loan Fund (EDLF)

NYCEDC will apply for \$10 million in grant funding, the maximum award allowed, through the Greenhouse Gas Reduction Fund created by the federal government's Inflation Reduction Act. NYCEDC will seek funding to

enable a recapitalization of the EDLF in order to support lending toward emerging developers focused on green construction.

62. Implement the Plant-Powered Carbon Challenge PlaNYC

The Mayor's Office of Food Policy will work with New York City's private sector to commit to reducing their food-based carbon emissions 25 percent by 2030 by transitioning to low-carbon, plant-forward foods. They will work with universities, healthcare systems, sports arenas, hospitality groups, and food service providers to measure and track their food-based emissions and build a sustainable resource network for sourcing more climate-friendly foods.

63. Establish M/WBE Procurement Opportunities

The Department of Small Business Services will launch annual open houses to connect M/WBEs with green economy-related city procurement opportunities. The Earth Day event in April will focus on sustainability, energy efficiency, resilience, and adaptation projects. During SBS' annual Citywide M/WBE Procurement Fair in Fall 2024, their Division of Economic and Financial Opportunity (DEFO) will host an Opportunity Room focused on the green economy. Events could include the Mayor's Office of Climate and Environmental Justice, NYCEDC, Office of Community Hiring, and the Departments of Parks & Recreation, Environmental Protection, Housing Preservation & Development, among others, to share policy and legislative issues, contracting opportunities, grant and financing programs, workforce development programming, and capacity building efforts for M/WBEs to avail of and gain access to business and revenue growth opportunities from these projects. In addition to presenting contracting and revenue growth opportunities, these open houses will connect M/WBEs to capacity building that helps them increase their own energy efficiency and environmental resilience as operating businesses, in order to grow the green economy further.



Working Together

Working Together

The City will work with our private, public, and nonprofit partners to meet the demands of the climate crisis, protect New Yorkers, and grow the green economy. We will work to build an equitable green economy, ensuring New Yorkers can get adequate training to enter high-growth sectors and access family-sustaining wages. We will implement this action plan alongside a newly formed Green Economy Advisory Council composed of leading community, business, and nonprofit stakeholders. The Council stakeholders are critical players in NYC's green economy and around the globe, and are making flagship commitments of their own to address the climate crisis and capture economic opportunity.

Beyond this Advisory Council, there are many opportunities for New Yorkers, nonprofits, startups, incumbent businesses, and others to begin or deepen their involvement in the green economy.

FOR COMPANIES IN NEW YORK CITY'S EXISTING INDUSTRIES

The companies that make up the energy, buildings and construction, and finance and consulting subsectors could contribute 70 percent of projected growth in the green economy by 2040. It's critical for the City to partner with these companies and make resources available to them and their workers to ensure their transition to green activities. As an immediate action, these companies can partner with workforce programs like Urban Green Council's GPRO training and certificate program, which equips employees with green building skills. Companies can also recruit workers from any of the City's green economy workforce programs run by various Community Business Organizations and CUNY schools.

Developers, financiers, and manufacturers engaged in the renewable energy space can leverage the expanded production, investment, and manufacturing federal tax credits available for bringing projects on line. Companies in the building decarbonization space can tap into the rebates for households and building owners for whole-home retrofits and decarbonizing building systems like Con Edison's Commercial and Industrial Energy Efficiency (CIEE) Program and NYSERDA's FlexTech assistance program. Building owners, property managers, and developers can utilize the NYC Accelerator, which provides support around how to decarbonize real estate. Small businesses can explore ConstructNYC, which supports small-to-mid-sized M/WBE construction firms looking for opportunities to work on City projects and pick up green building skills.

FOR NONPROFITS, COMMUNITY GROUPS, POLICY AND ADVOCACY GROUPS, AND WORKFORCE DEVELOPMENT PROVIDERS

The efforts of these stakeholders will be critical for ensuring an inclusive green economy for all New Yorkers, particularly those within NYC's historically marginalized communities. Partner with NYC Talent and industry through programs like the Green Workforce Partnership to create pathways for New Yorkers with a range of skills. Lean into the federal government's unprecedented prioritization of underserved communities in the rollout of climate programs, and tap into relevant grants and opportunities, including the IRA Community Change Grants Program and upcoming City programs like the Talent Investment Fund.

FOR CLIMATE STARTUPS AND COMPANIES POISED TO MAKE NET NEW INVESTMENTS IN NYC'S NEW GREEN ECONOMY

The market opportunity in NYC is unparalleled. New York is already a leading center of climate innovation as well as a center for the global economy, providing the infrastructure, talent, and market to grow a business. Startups and companies looking to make new investments in the city's green economy can work with one of NYC's many accelerators (e.g., Newlab, Urban Future Lab, Indie Bio, Tech Stars NYC, and Big Idea Ventures). Companies can connect with the Harbor Climate Collaborative and leverage opportunities for piloting new technologies through programs like Pilots at BAT. Companies can further take advantage of non-dilutive capital grant programs from sources like the federal DOT, NYC Public Schools, NOAA, and EPA, among others, made available as part of the federal IIJA, CHIPS, and IRA. State and City financing is available to companies as well, such as Innovation@NYSERDA's Climate Tech Innovation programs and NYCEDC's rolling Greenlight Industries Fund.

FOR NEW YORKERS WHO WANT TO ENTER THE GREEN ECONOMY

Opportunities are endless for workers, entrepreneurs, and consumers, and everyone can make an impact. For New Yorkers who would like to work in the green economy, there are many resources and programs in NYC to help you learn and prepare for green careers. You can apply to programs like Green City Force, Solar One's Green Workforce Program, or Green Careers NY. For various employment, training, and education

resources, many of which fall within the green economy, visit Job Ready NYC and the Department of Small Business Services' Career website, nyc.gov/getwork. If you are an aspiring climate founder, kick off your entrepreneurial journey by applying to NYCEDC's Founder Fellowship program. As a consumer, you can support your local green businesses; your preferences and dollars are a key driver of the green economy.

NYC will take bold action to facilitate the growth of the green economy. Ensuring it thrives will require continued partnership and engagement from New Yorkers and the private sector. To stay up-to-date on current and upcoming opportunities in the green economy:

- Visit the action plan webpage (edc.nyc/GEAP) to sign up for the latest updates
- Subscribe to NYCEDC's RFP list
- Sign up to receive updates to the City Record for all active solicitations from NYC agencies

Together we can ensure an equitable and sustainable future for all New Yorkers.



Source: Henrick Conde / Getty Images

Appendix A: Economic Analysis Methodology
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Appendix C: Sector-Level Estimates and Drivers
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Appendix

Appendix A:

Economic Analysis Methodology

DEFINING THE GREEN ECONOMY

A standard definition of the green economy does not exist nationally or globally and, as a result, various cities and regions across the world have chosen to define and segment their green economies in different ways. Some jurisdictions also use different terminologies, such as the “low-carbon goods and services sector” or focus on specific subsets of the larger green economy, such as the “circular economy” and “clean energy economy.” For the purposes of this Action Plan, New York City required a tailored green economy taxonomy that includes the major green activities taking place here and aligns with the City’s policy priorities and economic goals. To develop this definition, the consultant team adopted two primary approaches:

1. **Review of existing peer city and region studies:** The consultant team reviewed green economy, or related, assessments for London, Toronto, Amsterdam, Stockholm, New Jersey, Chicago, Los Angeles, and Miami and documented the sectors and activities evaluated in each study and their rationale for inclusion. The team also reviewed NYSERDA’s annual Clean Energy Jobs report for New York State to understand how they define and categorize clean energy activities, which are a part of the state’s larger green economy.
2. **Qualitative analysis of New York City-specific green activities:** The consultant team interviewed industry experts and representatives from organizations in various sectors (listed in the acknowledgments) to understand the nature and extent of green activities and companies that exist in New York City today and those that may emerge in the future.

SIZING THE GREEN ECONOMY

A standard methodology to size the entire green economy does not exist, primarily because the green economy consists of many different sectors of varying levels of maturity that are not tracked by traditional economic data sources, such as the Bureau of Labor Statistics (BLS). As a result, data availability varies considerably across green economy sectors, with more established sectors having some readily available economic data and nascent ones having little to none. As such, the consultant team adopted tailored methodologies to size the number of jobs in individual sectors, which were then aggregated to estimate the overall size of the green economy in New York City in 2021 (the latest year for which data was available across all sectors). The consultant team used three primary methods to determine the number of green economy jobs in NYC.

1. **Using readily available published data by the U.S. Department of Energy:** The U.S. Department of Energy (DOE)’s U.S. Energy and Employment Report (USEER) is a comprehensive summary of national, state, and county-level energy jobs broken down by sector and subsector. DOE began publishing the USEER in 2016 to better track and understand employment within key energy sectors that have been difficult to follow using other publicly available data sources. The study combines surveys of businesses with public labor data to produce estimates of employment and workforce characteristics.
2. **Estimating the ‘green’ share of traditional sectors:** For subsectors that are a part of larger, more traditional industries that are tracked by traditional economic data sources (e.g., green finance, which is a subset of the broader finance and insurance industry), the consultant team estimated a “green haircut” of the traditional industry to size its “green” share. This was necessary because traditional economic data from sources such as the BLS are not yet available for green economy subsectors specifically. To estimate these haircuts, the team conducted extensive research involving a review of relevant global, national, and local sector-specific data and market research, and gleaned additional insight from conversations with industry experts.
3. **Creating bottom-up estimates of jobs for nascent sectors lacking existing data:** For subsectors lacking existing data sources, the consultant team developed bespoke, bottom-up methodologies to

estimate jobs. For example, to estimate jobs in the resilience infrastructure sector, the team collected capital commitment, cost, and spending data for relevant projects from the NYC Office of Management and Budget (OMB), the Office of the NYS Comptroller, and the U.S. Army Corps of Engineers (USACE), and used economic input-output multipliers from Lightcast to convert estimated spending levels to jobs. For the sustainable food subsector, the team compiled a dataset of relevant businesses and identified their headcount using LinkedIn data.

Following the completion of the initial job estimates, the consultant team engaged with industry professionals from various sectors to validate the estimates and make necessary adjustments. This validation process involved testing the initial estimates against stakeholders' industry knowledge, additional data sources, and making minor revisions to ensure the final job estimates accurately reflect the size of New York City's green economy sectors. The table below indicates the primary approach used to estimate jobs in each green economy subsector.

SECTOR	SUBSECTOR	PRIMARY SIZING METHODOLOGY USED
ENERGY	Solar	DOE data
	Offshore wind	DOE data
	Onshore wind	DOE data
	Hydropower	DOE data
	Other	DOE data
	Clean fuels	DOE data
	Smart grid	DOE data
BUILDINGS	Storage	DOE data
	Building decarbonization	DOE data
TRANSPORTATION	Sustainable building materials	DOE data
	Electric vehicles	DOE data
	Micromobility	Bottom-up estimation
WASTE	Green freight and logistics	"Green" share of traditional sector
	Recycling	"Green" share of traditional sector
CONSUMER PRODUCTS	Sustainable food	Bottom-up estimation
	Sustainable fashion	"Green" share of traditional sector
FINANCE & CONSULTING	Green finance	"Green" share of traditional sector
	Climate consulting and accounting	"Green" share of traditional sector
RESILIENCE INFRASTRUCTURE	Coastal adaptation	Bottom-up estimation
	Inland adaptation	Bottom-up estimation
POLICY & ADVOCACY	Sustainability policy, planning, and advocacy	"Green" share of traditional sector

FORECASTING THE SIZE OF THE GREEN ECONOMY

A forecasting analysis was undertaken for each subsector to understand their potential size in terms of jobs in 2030 and 2040. The analysis involved an assessment of policies, investments, and initiatives that would influence subsectors’ trajectories, market research and industry studies, existing forecasts for specific subsectors (where available), and interviews with industry experts. These subsector forecasts were then aggregated to estimate the potential size of the green economy in New York City in 2030 and 2040. The consultant team used two methods to forecast the number of green economy jobs in NYC.

1. Estimating NYC’s share of existing state-level forecasts, where available: The New York State Climate Action Council’s Just Transition Working Group (JTWG) commissioned the *2021 Jobs Study* to forecast the number of jobs in various sectors over the next two decades across the state as a result of implementing the State’s Climate Leadership & Community Protection Act. For the relevant green economy subsectors, the consultant team applied

“capture rates” to the corresponding state-level job forecasts to create NYC-level forecasts. These capture rates were determined by evaluating NYC’s current and historical share of statewide jobs for each subsector, as well as an assessment of City and State policies, initiatives, and investments that could influence the future trajectories of these subsectors.

2. Conducting market research: For subsectors that did not have state-level forecasts available, the consultant team evaluated industry outlook studies at the local, national, and global level, as well as similar studies from peer cities (e.g., London and Toronto). The consultant team developed research-driven forecasts for these subsectors based on the projected trends in these studies, as well as an evaluation of relevant policies, initiatives, and investments, and conversations with industry stakeholders on subsector-specific challenges and opportunities.

The table below indicates the primary method adopted for each subsector:

SECTOR	SUBSECTOR	PRIMARY FORECASTING METHODOLOGY USED	
ENERGY	Renewable energy	Solar	Capture rate of state-level forecasts
		Offshore wind	Capture rate of state-level forecasts
		Onshore wind	Capture rate of state-level forecasts
		Hydropower	Capture rate of state-level forecasts
		Other	Capture rate of state-level forecasts
	Clean fuels	Capture rate of state-level forecasts	
	Smart grid	Capture rate of state-level forecasts	
	Storage	Capture rate of state-level forecasts	
BUILDINGS	Building decarbonization	Capture rate of state-level forecasts	
	Sustainable building materials	Capture rate of state-level forecasts	
TRANSPORTATION	Electric vehicles	Capture rate of state-level forecasts	
	Micromobility	Market research	
	Green freight and logistics	Market research	
WASTE	Recycling	Market research	

SECTOR	SUBSECTOR	PRIMARY FORECASTING METHODOLOGY USED
CONSUMER PRODUCTS	Sustainable food	Market research
	Sustainable fashion	Market research
FINANCE & CONSULTING	Green finance	Market research
	Climate consulting and accounting	Market research
RESILIENCE INFRASTRUCTURE	Coastal adaptation	Market research
	Inland adaptation	Market research
POLICY & ADVOCACY	Sustainability policy, planning, and advocacy	Market research

ESTIMATING NEW AND TRANSITIONING JOB GROWTH

The forecast job increases in the green economy will be a combination of new jobs (i.e., net new jobs in the city’s overall economy) and transitioning jobs (i.e., jobs that already exist within the overall economy, but become part of the green economy due to the changing nature of work). Due to a lack of data on the new or transitioning nature of these job increases in precedent industry studies and market research, the consultant team relied on qualitative insights derived from conversations with industry professionals to arrive at an estimate of the forecast share of new and transitioning job growth in the green economy. Given the inherent imprecision of using qualitative methods only, the consultant team provided a wide range for the forecast share of new and transitioning job growth.

ESTIMATING THE GREEN ECONOMY’S CURRENT AND FUTURE ECONOMIC CONTRIBUTIONS

To estimate the green economy’s other economic contributions beyond jobs, namely workforce earnings and GDP contributions, the consultant team used economic input-output multipliers from Lightcast, a commercial provider of economic and labor market data, to convert current and forecast green economy jobs to current and forecast workforce earnings and GDP contributions. The multipliers were mapped to each subsector based on subsector-specific “industry mixes” of North American Industry Classification System (NAICS) codes that most closely reflect the subsector’s composition. The workforce earnings and GDP contributions forecasts are in real 2021 dollars.

IDENTIFYING AND ANALYZING FOCUS OCCUPATIONS

While many conventional industry assessments based on NAICS data feature a breakdown of industrywide jobs by occupation, such analysis was not possible for this assessment due to the need to use unconventional datasets and methodologies to size NYC’s green economy. Creating green economy-specific occupation-level forecasts was therefore also not possible. In view of this, a set of criteria, as described below, were established to identify and build an understanding of the occupations with high growth potential that are crucial to the green economy. Ultimately 21 “focus” occupations were identified based on these criteria.

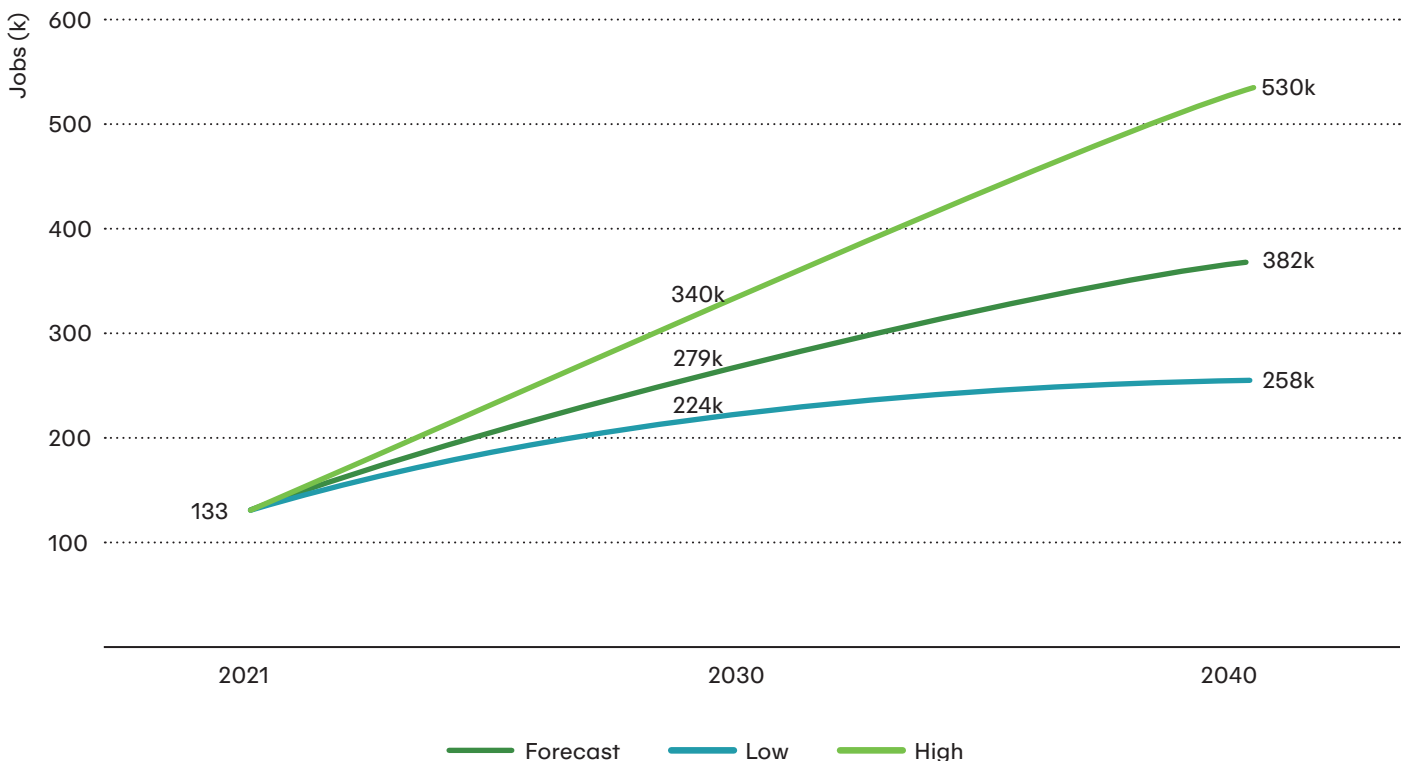
CRITERIA	METHODOLOGY USED
1. OCCUPATION REQUIRES GREEN-SPECIFIC SKILLS AND KNOWLEDGE	Determined based on conversations with industry experts, employers and workforce providers, review of curricula of relevant training programs.
2. FORECAST TO INCREASE IN DEMAND	Determined based on economy-wide occupational forecasts for New York City from the NYS Department of Labor (DOL)'s long-term occupational projections from 2020 to 2030. For occupations with no such forecasts available, this was determined based on conversations with industry experts and employers.
3. PAYS FAMILY-SUSTAINING WAGES OR A PATHWAY TO JOBS THAT PAY FAMILY-SUSTAINING WAGES	Determined based on a comparison of each occupation's median wage (from the NYS DOL's Occupational Employment and Wage Statistics or Lightcast) to the 2023 family-sustaining wage of \$63,000 for New York City (from the Massachusetts Institute of Technology's Living Wage Calculator), which assumes two working household members in a four-person household. Occupations below the family-sustaining wage threshold were evaluated for potential progression to higher-paying positions with wages greater than the threshold based on Lightcast's career pathways tool and insights from industry stakeholders.

Note: This assessment does not include an in-depth analysis of occupations or workforce needs specific to the offshore wind subsector. The State, via NYSERDA, has published an Offshore Wind Workforce Gap Analysis and an Offshore Wind Workforce Skills Analysis, and the City and State are already investing in various workforce development initiatives to support this industry's growth.

Appendix B: Job Forecast Sensitivity Analysis

Given the inherent uncertainty in forecasting future outcomes, a sensitivity analysis was conducted on the job forecast assumptions to illustrate the extent of potential alternative outcomes over the next two decades. Per this analysis, NYC’s green economy could employ fewer than the forecast 382,000 jobs in 2040 if NYC’s green economy growth does not accelerate because of lower-than--expected public and private investment in green sectors, which could occur due to myriad reasons. Conversely, NYC’s green economy could employ over 530,000 jobs in 2040 if green economy growth accelerates far beyond expected levels.

NYC GREEN ECONOMY JOBS FORECAST (SENSITIVITY ANALYSIS)



Appendix C: Green Economy Sector-Level Estimates and Drivers

This section includes the 2016 and 2021 job estimates and the 2030 and 2040 job forecasts for each sector and subsector, as well as the expected key drivers in each sector.

BUILDINGS

SUBSECTOR	2016	2021	2030	2040	CAGR (2016-2021)	CAGR (2021-2030)	CAGR (2030-2040)
BUILDING DECARBONIZATION	57,304	64,883	128,465	148,333	2.5%	7.9%	1.4%
SUSTAINABLE BUILDING MATERIALS	1,103	1,343	2,707	3,126	4.0%	8.1%	1.4%
TOTAL	58,407	66,226	131,172	151,458	2.5%	7.9%	1.4%

The green economy’s buildings sector is expected to see an increase of 85,200 jobs by 2040, accounting for 34 percent of the forecasted green economy job growth over this period. Two-thirds of this increase is expected to be driven by job transitions from the conventional architecture, engineering, and construction (AEC) industry, whereas one third is expected to be driven by net new job creation.

Key factors expected to drive this growth include:

- City and State mandates and policies including:
 - NYC’s landmark building decarbonization policy, Local Law 97, which caps emissions for 50,000 of the city’s large privately owned buildings starting in 2024, with stricter emission limits coming into effect in 2030. Today, about 63 percent of eligible properties are estimated to exceed the emissions limits set for 2030 and will need to implement emission-reduction measures (e.g., energy efficiency retrofits, electrification, on-site renewable energy, purchasing renewable energy credits, etc.) to comply with the law and avoid penalties.⁴⁰
 - Local Law 154, which sets emissions limits that effectively phase out fossil fuels in new buildings and gut renovations starting in 2024.

- The State’s ban on natural gas and fossil fuels in most new buildings starting in 2026.
- The City’s work to make City-owned buildings more efficient and advance solar and storage projects in these buildings to meet the Local Law 97 mandates.
- Federal home energy efficiency and electrification consumer rebates authorized under the Inflation Reduction Act (IRA).
- Emerging efforts to reduce buildings’ embodied carbon emissions by using recycled building materials, mass timber, and other sustainable materials. Existing initiatives include NYC’s Clean Construction Executive Order (EO 23), announced in 2022, that requires the city’s capital project agencies to commit to actions to lower embodied carbon from municipal construction projects. Another existing initiative is NYCEDC’s NYC Mass Timber Studio, which provides technical assistance to support mass timber development projects in early phases of project planning and design.
- More companies and investors are leasing or investing in low-carbon buildings to meet their own sustainability and emissions-reduction targets.

FINANCE & CONSULTING

SUBSECTOR	2016	2021	2030	2040	CAGR (2016-2021)	CAGR (2021-2030)	CAGR (2030-2040)
GREEN FINANCE	6,137	13,477	55,713	90,751	17.0%	17.1%	5.0%
CLIMATE CONSULTING AND ACCOUNTING	820	1,025	2,096	3,364	4.6%	8.3%	4.8%
TOTAL	6,957	14,502	57,809	94,115	15.8%	16.6%	5.0%

The green economy's finance and consulting sector is expected to see an increase of 80,000 jobs by 2040, accounting for 32 percent of the forecasted green economy job growth over the same period. Much of this increase is expected to be driven by job transitions from the conventional finance, insurance, and professional services sectors.

Key factors expected to drive this growth include:

- Global investor preference shifting toward sustainable investment opportunities and a growing number of climate-focused organizations and projects in need of financing.
- Market signals from NYC's largest banks, including JP Morgan Chase and Citi, as they build on the trillions already invested to address climate change and contribute to sustainable development by 2030.
- The deployment of federal tax incentives (e.g., production tax credit, investment tax credit, and manufacturing tax credits, etc.) being maintained and expanded by the IRA.
- Growth of the city's climate tech venture capital ecosystem, which has gained momentum in recent

years and will be further supported by catalytic City investments in the space.

- Increasing demand for climate consulting and carbon accounting services from businesses that must adapt to more stringent government policies, regulation, and changing investor/consumer preferences. For example, the US Securities and Exchange Commission (SEC) proposed a rule that would require US publicly traded companies to disclose annually how their businesses are assessing, measuring, and managing climate-related risks. If adopted, this rule would significantly increase the need for carbon accounting, climate risk data, and associated consulting services.

TRANSPORTATION

SUBSECTOR	2016	2021	2030	2040	CAGR (2016-2021)	CAGR (2021-2030)	CAGR (2030-2040)
ELECTRIC VEHICLES	2,043	4,750	12,667	31,925	18.4%	11.5%	9.7%
MICROMOBILITY	335	935	2,970	4,396	22.8%	13.7%	4.0%
GREEN FREIGHT AND LOGISTICS	879	1,043	1,778	2,632	3.5%	6.1%	4.0%
TOTAL	3,256	6,728	17,414	38,952	15.6%	11.1%	8.4%

The green economy's transportation sector is expected to see an increase of 32,200 jobs by 2040, driven by a mix of net new jobs and transitioning jobs.

Key factors expected to drive this growth include:

- New York State's Zero Emission Vehicle (ZEV) Requirements, mandating that all new passenger vehicles sold in the state by 2035 are zero-emission models.
- The MTA's Zero-Emission Transition Plan, which will replace and transform its entire bus fleet with zero-emissions vehicles by 2040.
- Federal tax incentives that have been extended or created for electric vehicles and EV charging equipment, and new funding for vehicle fleet acquisitions, under the IRA.
- NYC's commitments to expand the city's EV charging network, support EV adoption of taxis and for-hire vehicles, and electrify school buses by 2035, as outlined in PlaNYC.
- NYC's commitment to increase the city's sustainable mode share (trips completed via walking, biking, or transit) to 80 percent by 2050, as outlined in PlaNYC.
- NYC's \$138 million investment into several green freight initiatives including transitioning freight volume from trucking to maritime and rail freight, electrifying delivery fleets, and piloting electric cargo bikes for last-mile deliveries.
- Widespread consumer adoption of micromobility devices and shared mobility systems.

ENERGY

SUBSECTOR		2016	2021	2030	2040	CAGR (2016-2021)	CAGR (2021-2030)	CAGR (2030-2040)
RENEWABLE ENERGY	SOLAR	2,719	4,050	6,979	8,898	8.3%	6.2%	2.5%
	OFFSHORE WIND	–	185	5,129	8,239	–	44.6%	4.9%
	ONSHORE WIND	1,411	1,739	1,994	2,058	4.3%	1.5%	0.3%
	HYDROPOWER	2,516	2,197	2,406	2,364	-2.7%	1.0%	-0.2%
	OTHER	1,737	2,733	3,806	4,455	9.5%	3.7%	1.6%
CLEAN FUELS		450	353	391	383	-4.7%	1.1%	-0.2%
SMART GRID		57	117	259	430	15.5%	9.2%	5.2%
STORAGE		278	357	987	1,610	5.2%	11.9%	5.0%
TOTAL		9,167	11,731	21,950	28,438	5.1%	7.2%	2.6%

The green economy's energy sector is expected to see an increase of 16,700 jobs by 2040, accounting for 7 percent of the forecasted green economy job growth over this period. Most of this increase is expected to be driven by net new job creation, primarily due to heightened levels of net new investments in solar, offshore wind, and battery storage projects.

Key factors expected to drive this growth include:

- Increasing energy investments by the New York Green Bank and scaling of federal tax incentives and federal loans for clean energy projects contributing to achieve carbon neutrality by 2050.
- Public and private investment in the city's clean energy transition, catalyzed by significant City and State policies and commitments to achieve carbon neutrality by 2050, including:
 - NYC's 1 GW by 2030 solar deployment target (as of 2022, NYC was less than 45 percent of the way there),⁴¹ supported by the Public Solar program and NYSERDA's NY-Sun program.

- NYSERDA and NYCEDC's commitment to investing millions of dollars collectively to spur offshore wind facilities.
- NYSERDA's proposed Energy Storage Roadmap, calling for 2 GW of battery storage in NYC by 2030 (to date, only 23 MW, or roughly 1 percent of the target, has been built).⁴²
- New York City of Yes for Carbon Neutrality zoning to facilitate rapid deployment of solar and battery storage systems.
- Commitment from utilities to decarbonize the energy grid to achieve net-zero emissions by 2050.
- Additional technological innovation in other sectors (such as geothermal and biofuels) from companies, government agencies, and academic institutions. Examples include DEP's biogas-to-grid project at the Newtown Creek Wastewater Resource Recovery Facility and ConEd's initiative to pilot geothermal energy networks.

POLICY & ADVOCACY

SUBSECTOR	2016	2021	2030	2040	CAGR (2016-2021)	CAGR (2021-2030)	CAGR (2030-2040)
SUSTAINABILITY POLICY, PLANNING, AND ADVOCACY	2,745	2,987	7,640	12,445	1.7%	11.0%	5.0%

The green economy's policy and advocacy sector is expected to see an increase of 9,400 jobs by 2040, driven by a mix of job transitions and net new job creation.

Key factors expected to drive this growth include:

→ Recent climate legislation packages like the NYS Climate Act and the federal government's IRA, which provide billions of dollars in grants,

incentives, and loans, and prioritize investment in disadvantaged communities, which is expected to support increased policy development, planning, and advocacy.

→ Increased urgency from governments and advocacy groups on climate change and climate-oriented policy.

RESILIENCE INFRASTRUCTURE

SUBSECTOR	2016	2021	2030	2040	CAGR (2016-2021)	CAGR (2021-2030)	CAGR (2030-2040)
COASTAL ADAPTATION	10,287	12,067	12,565	13,142	-0.2%	0.4%	0.4%
INLAND ADAPTATION	7,343	10,193	13,312	17,907	10.4%	3.0%	3.0%
TOTAL	17,630	22,261	25,877	31,049	4.8%	1.7%	1.8%

The green economy's resilience infrastructure sector is expected to add 8,800 jobs by 2040, driven by a mix of job transitions and net new job creation.

Key factors expected to drive this growth include:

→ The City's investments in inland adaptation projects (e.g., green infrastructure and sewer system improvements) to mitigate the effects of extreme heat and extreme rainfall. Investment in inland protections are expected to grow in the coming years, leading to increased job growth in this sector. For example, the City recently increased investment in the relatively new Cloudburst Program by \$400

million. The program constructs clustered storm-water management projects in flood-prone communities throughout the City.

→ The City, State, and federal governments' significant investments in coastal adaptation projects in NYC, including the Lower Manhattan Coastal Resiliency project, the East Side Coastal Resiliency project and the USACE's New York New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study (HATS) plans, which is estimated to have a base cost of \$52 billion.

CONSUMER PRODUCTS

SUBSECTOR	2016	2021	2030	2040	CAGR (2016-2021)	CAGR (2021-2030)	CAGR (2030-2040)
SUSTAINABLE FOOD	709	1,316	2,514	3,852	13.2%	7.5%	4.4%
SUSTAINABLE FASHION	4,241	4,432	7,523	10,137	0.9%	6.1%	3.0%
TOTAL	4,950	5,748	10,037	13,989	3.0%	6.4%	3.4%

The green economy's consumer products sector is expected to see an increase of 8,300 jobs by 2040, driven by a mix of job transitions and net new job creation.

Key factors expected to drive this growth include:

→ Shifting consumer preferences toward more sustainable consumer products, especially in the fashion and food industry, which will encourage businesses to design and produce more sustainable products.

→ City and State policies and initiatives including:

- The City's commitment to reduce emissions from food purchases by 33 percent by 2030, as announced in April 2023.
- The City's investments to support the biotech industry and sustainability-focused biomaterial innovation and research, as demonstrated by NYCEDC's Materials Innovation Hub RFEI.
- The State's efforts to support local animal and plant fiber growing, processing, and textile manufacturing via the New York Textile Act.

WASTE

SUBSECTOR	2016	2021	2030	2040	CAGR (2016-2021)	CAGR (2021-2030)	CAGR (2030-2040)
RECYCLING	3,190	3,185	7,502	11,238	0.0%	10.0%	4.1%

The green economy's waste sector is expected to see an increase of 8,100 jobs by 2040, driven mostly by job transitions.

Key factors expected to drive this growth include:

- The City's commitment to provide recycling services to all residents, agencies, and institutions.
- The City's commitment to launch citywide curbside organics collection in 2024.
- Private businesses adopting more sustainable waste management strategies to meet their sustainability goals.

Appendix D:

Focus Occupations Data

JOBS, WAGES, AND EDUCATIONAL ATTAINMENT

FOCUS OCCUPATION	MEDIAN WAGE (2023)	JOBS (2023)	MOST COMMON EDUCATIONAL ATTAINMENT (2023)	PROJECTED GROWTH (2020-2030)
CONSTRUCTION, INSTALLATION, & OPERATIONS				
Maintenance and Repair Workers	\$53,322.00	66,590	High school diploma or equivalent	22.30%
Solar PV Installers	\$62,491.00	N/A	High school diploma or equivalent	N/A
Roofers	\$58,671.00	950	Less than high school diploma	13.50%
Construction Laborers	\$59,976.00	15,330	High school diploma or equivalent	23.20%
Glaziers	\$73,635.00	1,070	High school diploma or equivalent	24.70%
Carpenters	\$74,374.00	13,460	High school diploma or equivalent	19.30%
HVAC Mechanics & Installers	\$77,778.00	7,280	High school diploma or equivalent	17.90%
Plumbers	\$81,189.00	10,380	High school diploma or equivalent	21.60%
Electricians	\$88,374.00	16,920	High school diploma or equivalent	28.40%
Energy Auditors	\$83,305.00	N/A	High school diploma or equivalent	N/A
Stationary Engineers and Boiler Operators	\$103,116.00	2,590	High school diploma or equivalent	20.40%
First Line Supervisors of Construction Trades	\$105,304.00	10,190	High school diploma or equivalent	23.10%
Facilities Managers	\$130,635.00	3,720	High school diploma or equivalent	20.80%

ENGINEERING & ARCHITECTURE				
Architects	\$102,344.00	7,360	Bachelor's degree	10.20%
Civil Engineers	\$105,395.00	6,820	Bachelor's degree	15.50%
Electrical Engineers	\$106,068.00	2,650	Bachelor's degree	10.70%
Mechanical Engineers	\$105,248.00	1,760	Bachelor's degree	10.60%
BUSINESS / FINANCE				
Sustainability Specialists	\$87,981.00	N/A	Bachelor's degree	N/A
Project Management Specialists	\$114,718.00	34,630	Bachelor's degree	24.90%
MANAGEMENT				
Construction Managers	\$157,596.00	3,190	Bachelor's degree	18.80%
General and Operations Managers	\$143,786.00	101,140	Bachelor's degree	27.60%

Source: NYS DOL, Lightcast

RACE AND ETHNICITY (2021)

OCCUPATION	WHITE ALONE	BLACK OR AFRICAN AMERICAN ALONE	AMERICAN INDIAN ALONE	ALASKA NATIVE ALONE	AMERICAN INDIAN AND ALASKA NATIVE TRIBES SPECIFIED; OR AMERICAN INDIAN OR ALASKA NATIVE, NOT SPECIFIED AND NO OTHER RACES	ASIAN ALONE	NATIVE HAWAIIAN AND OTHER PACIFIC ISLANDER ALONE	SOME OTHER RACE ALONE	TWO OR MORE RACES	HISPANIC OR LATINO
CONSTRUCTION, INSTALLATION, & OPERATIONS										
Maintenance and Repair Workers	23.14%	23.73%	0.53%	0.00%	0.19%	9.45%	0.00%	1.74%	3.95%	37.28%
Solar PV Installers	37.28%	12.76%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	19.90%	34.69%
Roofers	44.94%	18.47%	0.00%	0.00%	0.00%	5.98%	0.00%	0.00%	0.00%	30.61%
Construction Laborers	16.35%	14.94%	0.00%	0.00%	0.00%	12.12%	0.00%	0.98%	1.34%	54.27%
Glaziers	44.73%	0.00%	0.00%	0.00%	0.00%	8.35%	0.00%	0.00%	1.39%	45.53%
Carpenters	25.85%	23.05%	0.00%	0.00%	0.00%	5.20%	0.00%	1.30%	4.03%	40.57%
HVAC Mechanics & Installers	29.98%	18.52%	0.00%	0.00%	0.00%	18.83%	0.00%	1.27%	4.64%	26.76%
Plumbers	32.53%	24.96%	0.09%	0.00%	0.06%	7.63%	0.00%	0.82%	2.22%	31.70%
Electricians	38.61%	21.35%	0.08%	0.19%	0.00%	5.81%	0.00%	1.19%	1.54%	31.22%
Energy Auditors	24.32%	25.87%	0.00%	0.00%	0.00%	25.00%	0.00%	0.55%	1.64%	22.63%

OCCUPATION	WHITE ALONE	BLACK OR AFRICAN AMERICAN ALONE	AMERICAN INDIAN ALONE	ALASKA NATIVE ALONE	AMERICAN INDIAN AND ALASKA NATIVE TRIBES SPECIFIED; OR AMERICAN INDIAN OR ALASKA NATIVE, NOT SPECIFIED AND NO OTHER RACES	ASIAN ALONE	NATIVE HAWAIIAN AND OTHER PACIFIC ISLANDER ALONE	SOME OTHER RACE ALONE	TWO OR MORE RACES	HISPANIC OR LATINO
Stationary Engineers and Boiler Operators	54.82%	7.93%	0.00%	0.00%	0.00%	8.57%	0.00%	2.86%	1.58%	24.25%
First Line Supervisors of Construction Trades	38.26%	15.83%	0.00%	0.00%	0.00%	9.98%	0.00%	1.38%	2.19%	32.36%
Facilities Managers	33.84%	16.74%	0.00%	0.00%	0.00%	8.11%	0.60%	0.00%	3.96%	36.75%
ENGINEERING & ARCHITECTURE										
Architects	58.95%	4.29%	0.00%	0.00%	0.00%	17.87%	0.00%	0.29%	3.21%	15.38%
Civil Engineers	45.76%	12.81%	0.00%	0.00%	0.00%	21.68%	0.00%	0.42%	3.02%	16.31%
Electrical Engineers	45.24%	18.61%	1.45%	0.00%	0.00%	13.61%	0.00%	0.26%	1.25%	19.58%
Mechanical Engineers	37.14%	8.95%	1.16%	0.00%	0.00%	16.81%	0.00%	3.28%	10.74%	21.92%
BUSINESS / FINANCE										
Sustainability Specialists	46.77%	13.26%	0.00%	0.00%	0.00%	20.63%	0.00%	0.94%	4.67%	13.73%
Project Management Specialists	55.13%	8.93%	0.29%	0.00%	0.00%	17.38%	0.00%	0.82%	2.32%	15.13%
MANAGEMENT										
Construction Managers	46.26%	10.60%	0.00%	0.00%	0.00%	17.15%	0.00%	0.69%	1.36%	23.94%
General and Operations Managers	46.66%	15.63%	0.19%	0.00%	0.00%	12.00%	0.00%	0.43%	2.85%	22.24%
All NYC Occupations	34.61%	20.08%	0.10%	0.00%	0.06%	14.69%	0.03%	0.94%	2.62%	26.87%

Source: US Census Bureau American Community Survey

GENDER (2021)

FOCUS OCCUPATION	MALE	FEMALE
CONSTRUCTION, INSTALLATION, & OPERATIONS		
Maintenance and Repair Workers	94.56%	5.44%
Solar PV Installers	100.00%	0.00%
Roofers	100.00%	0.00%
Construction Laborers	96.37%	3.63%
Glaziers	93.64%	6.36%
Carpenters	97.87%	2.13%
HVAC Mechanics & Installers	95.60%	4.40%
Plumbers	98.43%	1.57%
Electricians	97.79%	2.21%
Energy Auditors	79.88%	20.12%
Stationary Engineers and Boiler Operators	99.46%	0.54%
First Line Supervisors of Construction Trades	95.06%	4.94%
Facilities Managers	76.39%	23.61%
ENGINEERING & ARCHITECTURE		
Architects	60.80%	39.20%
Civil Engineers	77.23%	22.77%
Electrical Engineers	84.97%	15.03%
Mechanical Engineers	92.74%	7.26%
BUSINESS / FINANCE		
Sustainability Specialists	48.68%	51.32%
Project Management Specialists	46.77%	53.23%
MANAGEMENT		
Construction Managers	84.08%	15.92%
General and Operations Managers	54.46%	45.54%
All NYC Occupations	50.14%	49.86%

Source: US Census Bureau American Community Survey

Appendix E:

Acknowledgements

INTERVIEWEES AND PROFILES

We would like to thank the many individuals from the following organizations for their expert opinions and insights leveraged in this report.

32BJ Training Fund
 Alternative Sustainability
 AMF Electrical Contractors
 Amogy
 Arcadis
 Association of Contracting Plumbers of the City of New York
 BK ROT
 Bright Power
 Brightcore
 Brooklyn Grange
 Brooklyn Solarworks
 Brooklyn Workforce Innovations
 Building Energy Exchange
 CALSTART
 Castrads
 Center for an Urban Future
 Con Edison
 Conservation Labs
 Consortium for Worker Education
 Cornell University, Climate Jobs Institute
 CUNY Building Performance Lab
 CUNY Central
 CUNY City Tech Division of Continuing Education
 CUNY Offshore Wind Network
 Custom Collaborative
 Ecology Energy
 EcoSave Inc
 ElectricFish
 Endurant

Enertiv
 Equinor US
 FABSCRAP
 Fresh Meadow Mechanical Corp.
 Gilbane
 Gradient
 Green City Force
 Haydan Consultants
 Hines
 Hunter Roberts Construction Group
 IBEW Local Union No. 3
 Apprentice Program of the Electrical Industry
 Indigo River
 itselectric
 IUOE Local 94—International Union of Operating Engineers
 JP Morgan Chase Foundation
 Kevala Analytics
 Lab Farm Foods
 Local 638 union
 Massachusetts Clean Energy Center
 MicroGrid Networks
 Midea
 National Offshore Wind Research & Development Consortium
 Newlab
 Newleaf
 NineDot
 Nontraditional Employment for Women
 NSU Water
 NY Green Bank
 NYC Energy Efficiency Corporation
 NYSERDA

Offshore Wind Consultants
 Offshore Wind Innovation Hub
 PowerFlex
 PowerMarket
 Renewable Resource Group
 Re-Nuble
 Revel
 ReWire
 Sealed
 Skanska
 SolarOne
 Soltage
 Spencer Ogden
 Square Roots
 Stacks & Joules
 Steven Winter Associates, Inc.
 Streetlife Ventures
 Sunkeeper Solar
 The HOPE Program
 UA Plumbers Local 1
 UA Plumbers Local 1 Plumbers and Gas-Fitters Training Center
 Union Square Ventures
 Urban Electric Power
 Urban Future Lab
 Urban Green Council
 Wall Street Green Summit
 Workforce Development Institute

CONTRIBUTORS

The Green Economy Action Plan reflects the hard work, creativity, and dedication of many individuals from NYCEDC and NYC Talent, and many City agencies, who contributed their time, energy, and knowledge of the city to help shape the analysis and policy recommendations in this plan. The success of this effort would not have been possible without their involvement and care.

We would especially like to thank:

City Leadership

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 Abby Jo Sigal, Executive Director, Mayor's Office of Talent & Workforce Development
 Cecilia Kushner, Chief Strategy Officer, NYCEDC

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Mayor's Office of Talent & Workforce Development:
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Agencies

Brooklyn Navy Yard Development Corporation
 City University of New York
 Mayor's Office of Climate & Environmental Justice

Mayor's Office of Food Policy
 NYC Department of Citywide Administrative Services
 NYC Department of City Planning
 NYC Department of Sanitation
 NYC Department of Transportation
 NYC Department of Youth & Community Development
 NYC Housing Authority
 NYC Small Business Services
 NYC Public Schools
 NYS Energy Research & Development Authority
 Trust for Governors Island

Consultant Team

Buro Happold
 Urbane
 Public Works Partners
 Nowhere Office

Advisors

Blackhorn Ventures
 Urban Green Council

Appendix F:

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