council on THE GREEN ECONOMY

SEPTEMBER 2022

# GREEN JOBS FOR A SUSTAINABLE FUTURE

## LEVERAGING OUR STRENGTHS TO GROW AN INCLUSIVE GREEN ECONOMY

*Led by Honorary Chair First Lady Tammy Murphy*

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# Letter from the First Lady

Dear Colleagues,

As Chair of the Council on the Green Economy, I am thrilled to share the *Green Jobs for a Sustainable Future*. This document serves as New Jersey's guide to expanding access to green jobs, increasing workforce development and growing New Jersey's innovation ecosystem.

Beginning in January 2018, New Jersey has leapfrogged many states in building towards our green future, through a wide range of policies, programs, and investments. Combined with the leadership of the Murphy Administration, upcoming federal policies will put New Jersey on a clear path to strong growth of clean energy jobs and businesses. Achieving a transformed New Jersey that is cleaner, greener, and more innovative, will extend a generation of benefits across populations, regions, and sectors.

While green jobs are growing across the United States, the green economy overall is less diverse from a race and gender perspective than other sectors. Furthermore, on a national scale, many of the new jobs being created are not providing the career pathways, wages, and unionization benefits which early proponents had initially hoped. To ensure this is not the case in New Jersey, we are being intentional in our approach to the transition by asking key questions such as: how do we build a diverse workforce to fill green economy jobs? How do we develop a strong foundation for organized labor? How do we support business creation and innovation for the next generation of green jobs? How do we ensure the new training needed and the smooth transition to green jobs for our workforce?

These have been the guiding questions for this Council as we worked together with experts in the field to create our report. This report charts a course for New Jersey's green jobs to be *great* jobs, on the road to incredible careers, that maximize opportunities for organized labor and leave no potential worker behind. Through a collaborative partnership between government, private, and non-profit sectors, this report leverages our state's strengths while bolstering our areas for growth.

Moreover, we want the benefits from New Jersey's investments to accrue for our state, to keep green economy jobs within New Jersey, and to ensure that the businesses and hard-working men and women in sectors that will be most affected by the green economy transition can prosper in this new future.

I look forward to continuing our work together to make New Jersey an innovation hub for the green economy, with equitable access to training, innovation resources, jobs, and career pathways.

My very best,

Tammy S Murphy

**Tammy Murphy**
First Lady of New Jersey

# Acknowledgments

Special thanks to First Lady Tammy Murphy and Jane Cohen, Executive Director for the New Jersey Office of Climate Action and the Green Economy, for modeling the wisdom, ambition and perseverance that will be needed to create a nation-leading green economy in New Jersey.

Special thanks to the co-Chairs of the Council on the Green Economy, Robert Asaro-Angelo, Commissioner, New Jersey Department of Labor and Workforce Development, Joseph Fiordaliso, President, New Jersey Board of Public Utilities, Shawn LaTourette, Commissioner, New Jersey Department of Environmental Protection, and Tim Sullivan, Chief Executive Officer, New Jersey Economic Development Authority,

And with many thanks to the members of the Council on the Green Economy who shared their time, expertise and insights with us. These members are: Donnel Baird, Founder, BlocPower, Stefanie Brand, Former Director, New Jersey Division of Rate Counsel, Tom Churchelow, President, New Jersey Utilities Association, Francisco Cortes, President, New Jersey State Veterans Chamber of Commerce, Dave Daly, Former President, PSE&G, Kim Gaddy, Environmental Justice Organizer, Clean Water Action, Aisha Glover, Vice President of Urban Innovation, Audible, Daniel Gumble, Business Manager, I.B.E.W. Local 164, Kim Hanemann, President, PSE&G, Lisa Jackson, Vice President of Environment, Policy, and Social Initiatives, Apple, Sean Jackson, Chief Executive Officer, Isles, John Kennedy, Chief Executive Officer, New Jersey Manufacturing Extension Program, Kevin Lyons, Associate Professor of Supply Chain Archaeology, Rutgers University, Debra Coyle McFadden, Executive Director, Work Environment Council, Alli Gold Roberts, Director of State Policy, Ceres, and AJ Sabbath, President/CEO, The Advocacy & Management Group.

The *Green Jobs for a Sustainable Future* report could not have been completed without the review and other support of dedicated staff from the Administration of Governor Phil Murphy including:

Hugh Bailey, Lauren Banks, Taryn Boland, Bob Brabston, Jen Becker, Carolyn Cannella, Elizabeth Dragon, Lesley Hirsch, Alex Hydrean, Catherine Klinger, Stephanie Lagos, Pallavi Madakasira, Shannon McGee, Jeffrey Oakman, Angela Rotondo, Brian Sabina, Christine Sadovy, Joanne Sidoti, Preethy Thangaraj, and Nick Toth

Many thanks to individual presenters at Council on the Green Economy meetings: Warren Becker, Kristi Drutman, James Fakult, Kate Gold, Shaun Keegan, Melissa Lavinson, Maria Lopez-Nunez, Moises Luque, Anthony Parker, Peter Rose, Andre Thomas, Albert Turner, and Dieter Weissenrieder and the many stakeholders who participated in the interview process.

Project Director: Cai Steger

Research Consultants:
BW Research: Phil Jordan, Sarah Lehmann, Mitchell Schirch
Gabel Associates: Kassandra Damblu, Pam Frank, Isaac Gabel-Frank, Rebecca Harris
Coalition for Green Capital: Hannah Beinecke, Pari Kasotia, Cai Steger

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# Executive Summary

In February 2021, Governor Phil Murphy announced the creation of a Council on the Green Economy, convening cross-sector leaders in New Jersey's growing green economy to harness the opportunity created by the state's robust climate and clean energy policy accomplishments. The Council was tasked with delivering a Future of Green Jobs Report to define the pathways for green job creation, development of workforce capacity, and support for an innovation ecosystem that will be critical to building a nation-leading green economy. Under the leadership of Executive Director Jane Cohen, First Lady Tammy Murphy, and four distinguished co-Chairs,[1] this Green Jobs Council convened labor, industry, government, and advocates. The strategies outlined in the report are centered on advancing equitable access to green jobs for all New Jersey residents, identifying pathways for opportunity in the green economy for today's energy workers, and maximizing New Jersey's economic competitiveness.

## Current Landscape of Green Jobs in the State

Overall, New Jersey's current green economy[2] primarily consists of environmental infrastructure and energy efficiency jobs *(see Table 1: Green Jobs by Sector)*. Altogether, the environmental infrastructure sector accounts for 35,700 workers (ranking #14 nationally) and grew by roughly five percent from 2016 through 2019. Energy efficiency firms in New Jersey employ nearly 32,900 residents (ranking #23 nationally),

| Table 1. Green Jobs by Sector[3] | | | | |
|---|---|---|---|---|
| | **Total Jobs, 2020** | **National Ranking (by total jobs)** | **Overall Percent Change, 2016-2019** | **Percent Change, 2019-2020 (COVID)** |
| **Environmental Infrastructure** | **35,700** | **14** | **5.2%** | **-3.8%** |
| Water, Waste, & Wastewater Treatment & Management (incl. lead paint) | *21,834* | | 6.6% | -2.9% |
| Stormwater & Resiliency Infrastructure | 13,866 | | 3.2% | -5.3% |
| **Energy Efficiency** | **32,880** | **23** | **19.9%** | **-13.4%** |
| Traditional & High Efficiency HVAC/ Renewable Heating & Cooling | *16,775* | | 26.4% | -13.0% |
| ENERGY STAR & Efficient Lighting | *7,167* | | 31.8% | -13.0% |
| Advanced Materials & Other Energy Efficiency Technologies | *8,938* | | 2.9% | -14.7% |
| **Renewable Energy Generation & Clean Fuels** | **14,471** | **18** | **7.0%** | **-11.1%** |
| Renewable Energy Generation | *13,647* | | 6.8% | -11.3% |
| Clean Fuels | *824* | | 11.1% | -8.3% |
| **Alternative Vehicles** | **4,299** | **20** | **19.5%** | **0.5%** |
| **Grid Infrastructure & Storage** | **1,636** | **26** | **6.6%** | **-14.5%** |
| *Grid Infrastructure* | *949* | | -3.5% | -18.1% |
| *Storage* | *687* | | 27.1% | -8.9% |

growing 20% from 2016 to 2019. New Jersey ranks 18th nationally in renewable energy and fuels jobs, accounting for nearly 15,000 workers. New Jersey green jobs tend to have below-average representation of women and ethnic and racial minorities.

- Women are especially underrepresented in the green economy. Comprising just over half of New Jersey's overall labor market, female workers account for only 17 to 28 percent of green jobs across each of the five sectors.
- Similarly, Black or African American workers account for almost 16 percent of all workers in New Jersey yet represent only nine to 10 percent of green jobs across the state.
- Wastewater treatment, waste management, grid infrastructure and storage, and energy efficiency have the highest union membership rates. Unionization rates for the remaining green sectors are roughly comparable or slightly below state and national private sector averages.

## Assessment of Green Job Potential

New Jersey can expect to see an additional 314,888 net job-years[4] supported over the next 10 years based on current green policies and investments enacted across New Jersey to date. According to current modeling, building decarbonization (including energy efficiency-related work, renewable installation, and building electrification) and offshore wind offer the biggest opportunity for green job growth in New Jersey's economy. Offshore wind jobs will grow further after 2031, when future offshore wind projects come online.

Employment growth is spread across several industries in New Jersey. The construction industry will account for a net 76,124 job-years over 10 years, while the professional and business service industries will account for a net 57,888 job-years; these industries include engineering, legal, architectural, consulting, and other professional services that support the green economy. Additionally, green job growth will result in 73,238 net new job-years in the manufacturing industry.

The occupational groups projected to see the greatest growth over the next 10 years include construction and extraction, production occupations, and office and administrative support. Altogether, these three occupational groups will account for nearly 48 percent of all job growth over the next decade.

**Table 2. Employment Projections by Technology Sector (Job-Years), 2022-2031**

| | Job Gains | Job Losses | Net Growth |
|---|---|---|---|
| Solar | 103,565 | -16,819 | 86,746 |
| Energy Efficiency (Buildings) | 100,649 | -30,753 | 69,896 |
| Offshore Wind | 112,648 | -17,331 | 95,317 |
| Alternative Vehicles | 39,844 | -6,037 | 33,807 |
| Environmental Infrastructure | 25,293 | -4,315 | 20,978 |
| Grid Infrastructure & Storage | 11,432 | -3,288 | 8,144 |
| **TOTAL** | **393,431** | **-78,543** | **314,888** |

**Table 3. Employment Projections by Industry (Job-Years), 2022-2031**

| | Job Gains | Job Losses | Net Growth |
|---|---|---|---|
| Construction | 76,617 | - 493 | 76,124 |
| All Other Indirect and Induced Industries | 136,242 | - 60,248 | 75,994 |
| Professional Services | 66,847 | - 8,958 | 57,888 |
| Manufacturing | 73,639 | - 401 | 73,238 |
| Wholesale Trade | 22,580 | - 1,737 | 20,844 |
| Transportation & Distribution | 13,905 | - 4,484 | 9,421 |
| Utilities | 3,601 | - 2,225 | 1,376 |
| **TOTAL** | **393,431** | **-78,545** | **314,886** |

The modeling of employment impacts in this report is predicated on a continuation of New Jersey's currently supportive climate, clean energy and other green economy policies. This forecast does not include the full slate of economic or employment impacts from either the Infrastructure Investment and Jobs Act (IIJA) or the Inflation Reduction Act (IRA). Both bills will be significant drivers of future job creation for New Jersey's green economy.

## Need for Action

After engaging over 100 stakeholders, reviewing the data-driven analysis, and meeting throughout the year, this Council found that:

- With a continued commitment to addressing climate change and expanding clean energy, New Jersey will add tens of thousands of jobs to its green economy. However, if the state is not intentional about, and focused on, the outcomes of this job creation, many of these jobs will not deliver the career pathways, wage parity, and unionization benefits that are critical for a thriving economy.
- While green sectors such as offshore wind, energy efficiency, and solar will expand, emerging sectors will need further support, with a specific emphasis on innovation, manufacturing, and infrastructure.
- Absent specific programs to promote a diverse workforce and provide workforce training in the green economy, New Jersey's green workforce will continue to under-represent the diversity of New Jersey's racial and gender demographics, and jobs will be less accessible to students and workers in underserved communities.
- New Jersey's workforce development infrastructure is effective but must expand to keep pace with green job creation so that new jobs can be filled by New Jersey residents.
- While unions will continue to enjoy medium-to-high membership rates in certain green sectors relative to the national average, absent an intentional path forward, there will be missed opportunities for partnerships in workforce development, and legacy energy workers must be connected to targeted training and skills-refinement to access new opportunities.
- Supporting wage growth will be important to ensure wages in green sectors match other energy sectors.

## Strategic Recommendations

New Jersey has the opportunity to make future green job growth transformative for its economy. The report's strategic recommendations to accomplish this fall into three categories: (1) high-quality, accessible job creation, (2) training and support for a diverse workforce, and (3) support for innovation that will catalyze long-term green jobs growth. The report identifies assets and gaps in New Jersey's current green job ecosystem and recommends specific actions and pathways to achieve the strategic opportunities laid out below.

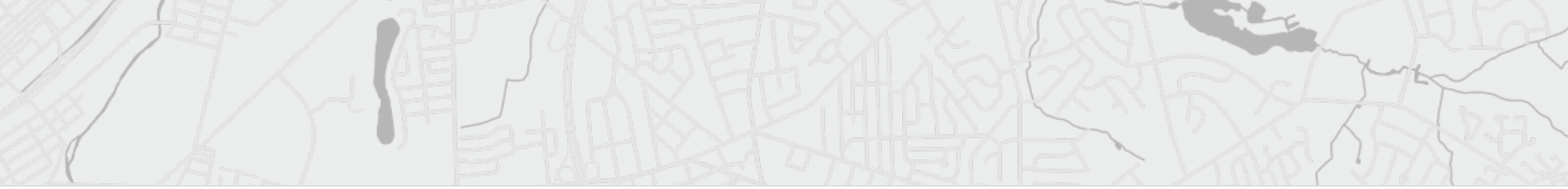
### Recommendations to achieve high-quality good jobs that are accessible to all:

**OPPORTUNITY 1:**

**Create High-Quality Green Jobs**

***Create green jobs that are also "good jobs," that offer family-sustaining wages and long-term career pathways.***

Developing 'good jobs' in the green economy is foundational to meeting New Jersey's vision of pathways to long-term careers and support for workers transitioning into green sectors. While the state's political leaders understand the transformative potential of good



jobs in the green economy, New Jersey currently ranks in the middle nationwide across all green job sectors. And while New Jersey's green jobs are higher wage and more unionized than national averages, there is room to improve earning potential and diversity and maximize union membership. New Jersey's recent leadership and investments in clean energy deployment create a significant opportunity for job creation, and the state cannot miss the generational chance to make these high-quality jobs.

*Recommendations include continuing to pursue high-growth green job creation through policies and infrastructure investment with ensuring high-quality jobs are created through various wage and job-quality requirements and agreements.*

### OPPORTUNITY 2:

**Prioritize Local and Targeted Job Creation**

***Maximize the benefits from green job growth in local and underserved communities, and populations.***

There are significant worker and community benefits to targeting job creation locally, especially for underserved communities. Local workers spend their wages locally, with indirect and induced multipliers, while the experience and training of a job supports future higher wages and long-term careers. Underserved communities can particularly benefit from this approach due to higher existing unemployment rates and underinvestment in critical capacity and infrastructure.

*Recommendations include geographically specific hiring targets, community workforce and benefit agreements, and helping small, minority and women-owned and veteran-owned businesses gain more access to procurements, contracts, and incentives. It is also critical to clarify the unique elements and capacities of the communities being served.*

### OPPORTUNITY 3:

**Put All Energy Workers Front and Center**

***Create and maintain pathways to enable legacy energy workers to pursue rewarding careers and high-quality jobs in the green economy.***

Research and stakeholder engagement for this road map did not uncover a comprehensive plan for a transition from a fossil-fuel-based economy. This will be critical for affected communities and all energy workers. Legacy workers will need additional supports and investments. More resources, capacity, and stakeholders engagement are needed to support impacted workers and enable career transitions to long-term, sustainable green career pathways.

*Recommendations include that the State should launch research on potential future impacts, assemble a multi-stakeholder working group to identify new utility business models and a clearly defined transition report, and explore the creation of an "impact" fund, all focused on workers, their families, and communities.*

## Recommendations to achieve a strong, well-trained, and demographically representative workforce:

### OPPORTUNITY 4:

**Target Gaps in Workforce Development**

***Target workforce development initiatives to support a diverse pipeline of workers in filling current and future green employment opportunities***

New Jersey already possesses a strong overall workforce development infrastructure. A targeted and collaborative approach to New Jersey's green workforce development will allow specific needs of the green economy to be filled while leveraging existing effective programs and capacities. The green sector already has many open positions demonstrating the need for worker pipelines and awareness-raising about these jobs. However, there are fewer training and career support capacities and credentials specific to the green economy, and there are concerns about meeting future demand in certain green sectors with trained workers. Engagement with green employers is also important but still under development in the state.

*Recommendations include a comprehensive information and resource strategy, targeted research to address information gaps, active and more dedicated employer convenings and partnerships, and a green jobs awareness-raising campaign.*

### OPPORTUNITY 5:
**Address Needs of Underserved Workforce**

***Focus on wraparound and comprehensive services and support for underserved communities, returning citizens, and transitioning workers to broaden the reach of the green economy.***

Most New Jersey green jobs do not currently represent the racial or gender diversity of the state as a whole. Without specific intentional efforts, many future green jobs will default to this status quo. Changing that dynamic requires focus on specific barriers faced by future workers, especially in underserved communities, that may require additional investment and support. For example, there is a lack of opportunities for entry-level, candidates, and trainees and interns/apprentices need income support and other resources. Wraparound services are hard to access but important to boost participation rates of underserved workers. Finally, critical on-the-ground community groups have limited funding and may be under-utilized.

*Recommendations include boosting green-related investments in underserved communities, expanding vocational reimbursement, developing a wraparound services strategy for addressing the many needs of underserved populations comprehensively (especially in transportation), and actively supporting community organizations.*

### OPPORTUNITY 6:
**Partner with Unions on Training**

***Partner with unions to improve and expand workforce training for the green economy that also facilitates new entrants from more diverse backgrounds.***

Union-supported training programs can help build the high-skilled workforce needed for the green economy. Union jobs are high-quality jobs. Building and Construction trades, along with many unions, offer members specialized, fully funded training pathways that lead to stable careers with family-sustaining wages and worker protections. These training programs can be especially transformative for the green economy if they also provide greater access to unions for non-union workers. However, unions need a clear and predictable pathway for future green job creation that could require apprenticeships as well as outside support in getting more individuals ready to enter apprenticeships.

*Recommendations include conducting research on workforce training and licensing needs in green sectors boosting pre-apprenticeship programs, as well as other efforts to expand access to apprentice programs.*

## Recommendations to achieve a robust innovation ecosystem:

### OPPORTUNITY 7:
**Boost Innovation**

***Grow new green technologies, services, and sectors, centered in New Jersey, through innovation and a supportive ecosystem.***

A thriving innovation ecosystem is foundational to supporting new industries and technologies that will maintain New Jersey's competitiveness and be the source of future jobs for New Jersey's workers. New Jersey is well-positioned geographically, economically, and financially and has growing momentum to continue to benefit from entrepreneurship and innovation. However, the infrastructure, resources, and networks that can support entrepreneurship can be further developed. This is especially true in underserved communities and among small, minority, and women-owned businesses.

*Recommendations include establishing spaces, supporting partnerships, and campaigns to support entrepreneurs, ensuring more equitable access to investment and resources for all green innovators in New Jersey, and harnessing the purchasing power of the State to seed innovation.*

### OPPORTUNITY 8:
**Expand Manufacturing and Supply Chain**

***Anchor manufacturing and supply chains in New Jersey to maximize gains in the green economy.***

Expanding New Jersey's manufacturing sector and supply chain in specific green industries can boost jobs, increase local economic development, and support innovation. Manufacturing jobs are typically high-wage jobs, accessible to a wide range of educational backgrounds. They also have the highest multiplier effect of any sector and can serve as a bedrock for innovation and the development of clusters. With policy certainty and investment, New Jersey has a strong manufacturing sector

that can be leveraged, but retooling factories and attracting companies to build green supply chains needs dedicated funding and focus.

*Recommendations include targeted research and analysis, manufacturing and supply chain commitments from major developers, supportive incentives and other tools for development, and retooling of supply chains and funding for education and training partnerships*

**OPPORTUNITY 9:**

**Align with Education Ecosystem**

***Leverage New Jersey's top-ranked education systems to develop the green workers, innovators, and entrepreneurs of the future.***

New Jersey has a very strong education system, but concerns have been raised about students' readiness for the workforce and a lack of focus on the green economy. There are opportunities in all areas: K-12, community college, vocational-technical schools and four-year colleges. To fill jobs in the green economy, education and awareness are crucial. Hands-on training and exposure starting in early high school (and before) can expose students to emerging green careers. Increasing awareness of green career opportunities, and the specific education requirements, will engage a broader cross-section of students.

*Recommendations include expanding awareness of green career opportunities from K-12, expanded financial assistance, greater partnerships, and building on existing, successful programs.*

# 12 Month Work Plan

The State agencies comprising the Council on the Green Economy steering committee are advancing key elements of the report, by planning, initiating and implementing programs, initiatives and pilot projects over the next 12 months. These initiatives, described in detail below, align with strategic recommendations across each opportunity identified in the report. They serve as real-world proof points of how to strategically expand green jobs and show the collective action that is already occurring in New Jersey.

**INITIATIVES:**

- Launch a new program, NJ Innovation Fellows, a diversity-focused initiative that will provide up to $250k for Black and Brown entrepreneurs to start a business. (NJEDA)
- Initiate the expansion and replication of stakeholder workgroups in two areas – offshore wind, in collaboration with NJEDA and the Wind Institute, and new clean energy technology. (NJBPU)
- Complete a workforce needs gap analysis for current and future projections of jobs specifically for the New Jersey green economy that includes skill transferability research specific to New Jersey's labor market in legacy energy industries. (GOCAGE)
- Launch a $10 million pilot to decarbonize state facilities, with a workforce capacity-building component through the Pay It Forward Program (GOCAGE/ NJBPU/DOL)
- Request Clean Energy/ Decarbonization plans from all 7 energy utilities and the 3-4 largest water utilities. (NJBPU)
- Implement the NJZIP workforce transportation solution pilot, funded at $15M, which will support the development of capacity to use zero-emissions vehicles to provide transportation to training and workforce opportunities for residents of underserved and non-transit-accessible communities. (NJEDA)
- Engage labor unions around workforce and training needs for unions in green sectors, and to support this engagement with additional research and analysis (GOCAGE)
- Launch the recently approved New Jersey Innovation Evergreen Fund (NJIEF), that will increase access to resources and capital by allowing the state to become an equity investor in startups. (NJEDA)
- Launch a new initiative laid out by Governor Murphy, the First Mover Manufacturing Program, which utilizes $15 million in funds to support capacity and innovation in the manufacturing sector. (NJEDA)

# 1 Introduction

# 1 | Introduction

New Jersey's green economy is growing well and creating benefits for the people who are participating in it. Over the next 10 years, New Jersey will add tens of thousands of jobs to the green economy, as clean energy, greenhouse gas (GHG) reduction, and resilience policies continue to be prioritized and implemented. Many more jobs will be created as New Jersey continues to put in place policies to meet its 2050 climate targets, such as those from the New Jersey Energy Master Plan[5], the 80×50 report,[6] and the Climate Change Resilience Strategy.[7]

New Jersey can seize the opportunity to make this job growth transformative for its workers, residents, new companies, and employers. To achieve this, the State and market actors will have to work together to create new high-quality jobs with equitable pathways for employment in underserved communities, to create workforce development programs that are accessible across the state, and to create a supportive and innovative ecosystem primed to welcome workers to new industries.

This report seeks to answer the question, "How can New Jersey ensure that this green transition results in benefits for all of New Jersey?" Using a combination of data-driven analysis, stakeholder interviews, and expertise of Council members, the report lays out strategic recommendations to ensure that a green transition reflects core objectives around equity and diversity, supports all energy workers and maximizes New Jersey's economic competitiveness.

## Methodology

To develop the report, the Council led a multi-step learning process. Detailed modeling and analyses were conducted to determine historical and current employment in New Jersey's green jobs sectors, to project occupational growth under current New Jersey decarbonization policies, and to crosswalk occupational data with modeled scenarios to predict employment patterns, and skills needed, in the future. Further research and learning involved conducting over 100 stakeholder interviews, holding listening sessions, digging deep into the policies and programs of other states, and leaning into the expertise of the Council members through interviews and in-depth topical meetings, tours, expert panels, and discussions.

Based on these streams of research, the Council has put forth in this report a set of strategic opportunities, with detailed recommendations, for how the State, the private sector, and others can leverage this transformative moment to realize the State's vision for a thriving green economy. The Council also lays out a 12-month workplan, in a separate document, that the Council and connected stakeholders will pursue to further this transition and march forward in fulfilling the potential for progress highlighted in this report.

# 2 Context for This Report

# 2 | Context for This Report

Over the past four years the Murphy Administration has ushered in many climate, clean energy, innovation, and workforce policies. To understand the impact of these new policies on green job growth, Governor Murphy issued Executive Order 221, which included the creation of the New Jersey Council on the Green Economy to deliver a 'report' to Governor Murphy. The Governor intended this report to chart a strategic and intentional path forward offering detailed job creation, workforce development, and innovation recommendations to guide New Jersey's transition to a green future. Members of the Council were selected to represent a breadth of voices, expertise, and experiences from New Jersey's many different stakeholders, industries, and regions, including eight commissioners from government agencies and the First Lady of New Jersey.

The First Lady has brought her expertise on climate education and her commitment to improving health outcomes to her leadership of the Council. The successes of agencies like the Department of Labor, Department of Environmental Protection, the Board of Public Utilities, and the Economic Development Authority set the stage for the Council's work. For example, through investments made by the Murphy Administration and the leadership of the Department of Labor, the number of registered apprenticeship programs in the state has increased by 87%, and the number of women in registered apprenticeships has doubled. The Department of Environmental Protection has worked to foster greater environmental equity and better serve historically underserved communities through its environmental infrastructure and investment programs in the state and has been leading the Administration's work on GHG emissions reductions. The Board of Public Utilities has

developed nation-leading clean energy programs while putting a new focus on clean energy equity. And the Economic Development Authority has invested millions of dollars into developing New Jersey's clean energy, innovation, and workforce ecosystem.

Building upon the investments the Murphy Administration has made to date, this report is part of an ecosystem of other New Jersey workforce, climate, and economic initiatives, anchored by the Murphy Administration's core tenets of a stronger, fairer, and more affordable New Jersey. The work of the Council and the report it has produced are meant to fulfill an aligned vision for New Jersey's green economy founded on the following principles:

## High-quality, good jobs that are accessible to all

An equitable green future begins by ensuring that green jobs are high-quality, 'good jobs' for all types of work, and inclusive to all New Jersey workers and unions. High-quality good jobs will provide New Jersey workers with family-sustaining wages, uphold industry safety standards, and offer pathways to good careers. These jobs can also benefit the local area where the job is found. Inclusive jobs have widely accessible entry-level opportunities, skill transferability from other industries, and equitable participation rates for all workers and businesses.

## A strong, well-trained, and demographically representative workforce

New Jersey will train and develop a diverse workforce that is able to meet the expected employment demand in New Jersey's green economy. This will entail addressing the needs of all New Jersey workers and regions through an aligned and well-funded regional workforce development ecosystem, targeted and dedicated training and education programs and career navigation supports, and a comprehensive system of wraparound services.

## A robust innovation ecosystem

Finally, New Jersey must continue to stimulate an innovative landscape for New Jersey green businesses and entrepreneurs, especially in underserved communities, to ensure greater competitiveness with other states for the additional green jobs of the future. This will include increasing access to capital for innovation through ongoing policy and investments in support of manufacturing, education, infrastructure, and entrepreneurialism in high-growth green sectors.

Based on the vision above, the Council proposes the following 2030 goals:

- The state's green workforce will reflect the diversity of the state's residents.
- Every county in New Jersey will see green job creation growth.
- A significant share of new green jobs created will be accessible to all existing energy workers.
- The percentage of women participating in the green economy will increase.
- Median wages in each sector will rise in real terms from current levels.
- Union membership in each green sector will grow, and new green union apprentice programs will reflect the diversity of the state's residents.
- There will be more Small, Minority, Women, and Veteran Owned Business Enterprises (SMWVBEs) participating in the green economy.

# 3 Analyzing New Jersey's Existing and Future Green Jobs

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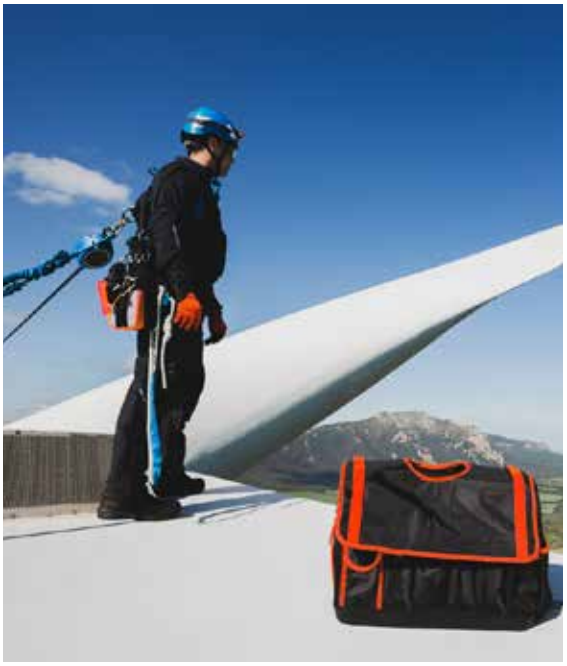

## Defining Green Jobs

To think holistically about employment in New Jersey's green economy, the Council needed a New Jersey-specific definition of "green jobs." The terms "green economy" and "green jobs" do not have a standard definition. For this report, the Council defines New Jersey's green economy as comprised of the following five sectors: environmental infrastructure, grid infrastructure and storage, renewable generation and fuels, energy efficiency, and alternative vehicles. These sectors were chosen due to their alignment with New Jersey's green policy landscape, both currently and into the future. Green jobs comprise workers who spent any portion of their time supporting these sectors.

To maximize this report's contribution to the development of New Jersey's transition to a green economy, the Council avoided future-looking scenarios or goal-driven analysis and maintained a focus on a narrower time frame of the next 10 years. These job gains offer a realistic and credible calculation based on the current state in New Jersey. They are predicated on a continuation of New Jersey's supportive climate, clean energy, and other green economy policies, with room for growth in the event of expected new investment and policy support.

## Current Landscape of Green Jobs in the State

Overall, New Jersey's current green economy primarily consists of environmental infrastructure and energy efficiency jobs *(see Table 1: Green Jobs by Sector)*. Altogether, the environmental infrastructure sector accounts for 35,700 workers (ranking #14 nationally) and grew by roughly five percent from 2016 through 2019. Energy efficiency firms in New Jersey employ nearly 32,900 residents (ranking #23 nationally), growing 20% from 2016 to 2019. New Jersey ranks 18th nationally in renewable energy and fuels jobs, accounting for nearly 15,000 workers.

# New Jersey ranks 18th nationally in renewable energy and fuels jobs, accounting for nearly 15,000 workers

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| *Stormwater & Resiliency Infrastructure* | *13,866* | | 3.2% | -5.3% |
| **Energy Efficiency** | **32,880** | **23** | **19.9%** | **-13.4%** |
| *Traditional & High Efficiency HVAC/ Renewable Heating & Cooling* | *16,775* | | 26.4% | -13.0% |
| *ENERGY STAR & Efficient Lighting* | *7,167* | | 31.8% | -13.0% |
| *Advanced Materials & Other Energy Efficiency Technologies* | *8,938* | | 2.9% | -14.7% |
| **Renewable Energy Generation & Clean Fuels** | **14,471** | **18** | **7.0%** | **-11.1%** |
| *Renewable Energy Generation* | *13,647* | | 6.8% | -11.3% |
| *Clean Fuels* | *824* | | 11.1% | -8.3% |
| **Alternative Vehicles** | **4,299** | **20** | **19.5%** | **0.5%** |
| **Grid Infrastructure & Storage** | **1,636** | **26** | **6.6%** | **-14.5%** |
| *Grid Infrastructure* | *949* | | -3.5% | -18.1% |
| *Storage* | *687* | | 27.1% | -8.9% |

In 2019, clean energy workers in New Jersey earned a median hourly wage of $24.22 – 12 percent higher than the overall statewide median wage of $21.64 across all occupations. Clean energy workers in New Jersey also earned slightly above the U.S. clean energy average wage of $23.89.

The top counties with the highest number of green jobs *(see Table 2 – Green Jobs by County and Technology Sector))* include Bergen (9,171), Middlesex (8,573), Monmouth (7,616), and Morris (6,891). As a percent of total jobs in the county, Hunterdon (4.9%) leads, followed by Salem (3.5%), Ocean (3.3%), and Sussex (3.2%).

| Table 2. Green Jobs by County and Technology Sector[9] | | | | | | |
|---|---|---|---|---|---|---|
| **County** | **Total Green Jobs** | **Environmental Infrastructure** | **Grid Infrastructure & Storage** | **Renewable Energy Generation & Clean Fuels** | **Energy Efficiency** | **Alternative Vehicles** |
| Atlantic County | 111,971 | 1,660 | 83 | 317 | 761 | 83 |
| Bergen County | 411,219 | 3,311 | 209 | 974 | 4,083 | 594 |
| Burlington County | 194,683 | 2,210 | 115 | 964 | 1,555 | 277 |
| Camden County | 192,700 | 1,830 | 79 | 624 | 1,773 | 265 |
| Cape May County | 34,836 | 487 | 7 | 51 | 263 | 33 |
| Cumberland County | 56,291 | 975 | 11 | 200 | 337 | 51 |
| Essex County | 309,005 | 2,730 | 91 | 629 | 2,624 | 304 |
| Gloucester County | 112,311 | 1,325 | 35 | 219 | 736 | 158 |
| Hudson County | 253,015 | 1,729 | 63 | 430 | 1,318 | 174 |
| Hunterdon County | 43,837 | 863 | 19 | 715 | 511 | 50 |
| Mercer County | 253,072 | 2,575 | 90 | 857 | 1,713 | 171 |
| Middlesex County | 414,228 | 3,586 | 216 | 902 | 3,391 | 478 |
| Monmouth County | 248,855 | 2,561 | 107 | 2,078 | 2,554 | 316 |
| Morris County | 277,222 | 1,792 | 155 | 1,254 | 3,370 | 320 |
| Ocean County | 163,168 | 1,729 | 40 | 1,939 | 1,410 | 202 |
| Passaic County | 153,839 | 1,416 | 52 | 311 | 1,258 | 191 |
| Salem County | 20,404 | 492 | 6 | 88 | 119 | 13 |
| Somerset County | 178,834 | 825 | 55 | 786 | 1,412 | 139 |
| Sussex County | 35,604 | 356 | 16 | 345 | 366 | 44 |
| Union County | 215,738 | 2,062 | 105 | 490 | 1,912 | 304 |
| Warren County | 30,188 | 215 | 8 | 109 | 193 | 52 |
| N/A | | 974 | 75 | 188 | 1,224 | 82 |

Green jobs, as defined in this report, tend to have below-average representation of women and ethnic and racial minorities in New Jersey.

- Women are especially underrepresented in the green economy. Comprising just over half of New Jersey's overall labor market, female workers account for only 17 to 28 percent of green jobs across each of the five sectors.
- Similarly, Black or African American workers account for almost 16 percent of all workers in New Jersey yet represent only nine to 10 percent of green jobs across the state.

Wastewater treatment, waste management, grid infrastructure and storage, and energy efficiency have the highest union membership rates, while the alternative vehicles sector has the lowest unionization rates. At about 24 percent, unionization rates for wastewater and sewage treatment jobs are significantly higher than

both national and statewide private sector averages. Similarly, a 12 to 13 percent union membership and coverage rate for waste management and remediation services sits above private sector averages. Unionization rates for the remaining green sectors are roughly comparable or slightly below state and national private sector averages.

## Assessment of Green Job Creation Potential in New Jersey

Based on New Jersey's current green policies and investments over the next 10 years, from 2022 through 2031, New Jersey's green economy is expected to support job growth across key sectors, including solar, energy efficiency, alternative vehicles, environmental infrastructure, offshore wind, and grid infrastructure and storage *(see Table 3 – Employment Projections by Technology Sector)*. Altogether, New Jersey can expect to see an additional nearly 314,888 net job-years[10] supported over the next 10 years based on current green policies and investments enacted across New Jersey to date. This forecast for job creation does not include the impacts from either the Infrastructure Investment and Jobs Act (H.R.3684) or the Inflation Reduction Act which is likely to be a significant driver of future job creation (See Sidebar titled "Impact of New Federal Policies"). Solar, energy efficiency, and offshore wind firms will account for eight in 10 new jobs through 2031. Offshore wind jobs will grow further after 2031, when future offshore wind projects come online.

**Table 3. Employment Projections by Technology Sector (Job-Years), 2022-2031[11]**

| | Job Gains | Job Losses | Net Growth |
|---|---|---|---|
| Solar | 103,565 | -16,819 | 86,746 |
| Energy Efficiency | 100,649 | -30,753 | 69,896 |
| Offshore Wind | 112,648 | -17,331 | 95,317 |
| Alternative Vehicles | 39,844 | -6,037 | 33,807 |
| Environmental Infrastructure | 25,293 | -4,315 | 20,978 |
| Grid Infrastructure & Storage | 11,432 | -3,288 | 8,144 |
| **TOTAL** | **393,431** | **-78,543** | **314,888** |

**Table 4. Employment Projections by Industry (Job-Years), 2022-2031[12]**

| | Job Gains | Job Losses | Net Growth |
|---|---|---|---|
| Construction | 76,617 | - 493 | 76,124 |
| All Other Indirect & Induced Industries | 136,242 | - 60,248 | 75,994 |
| Professional Services | 66,847 | - 8,958 | 57,888 |
| Manufacturing | 73,639 | - 401 | 73,238 |
| Wholesale Trade | 22,580 | - 1,737 | 20,844 |
| Transportation & Distribution | 13,905 | - 4,484 | 9,421 |
| Utilities | 3,601 | - 2,225 | 1,376 |
| **TOTAL** | **393,431** | **-78,545** | **314,886** |

## Industry Results

Employment growth is spread across several industries in New Jersey *(See Table 4 – Employment Projections by Industry)*. The construction industry will account for a net 76,124 job-years over 10 years, while the professional and business service industries will account for a net 57,888 job-years; these industries include engineering, legal, architectural, consulting, and other professional services that support the green economy.

Additionally, green job growth will result in 73,238 net new job-years in the manufacturing industry.

The occupational groups projected to see the greatest growth over the next 10 years include construction and extraction, production occupations, and office and administrative support. These three occupational groups will account for nearly 48 percent of all job growth over the next decade.

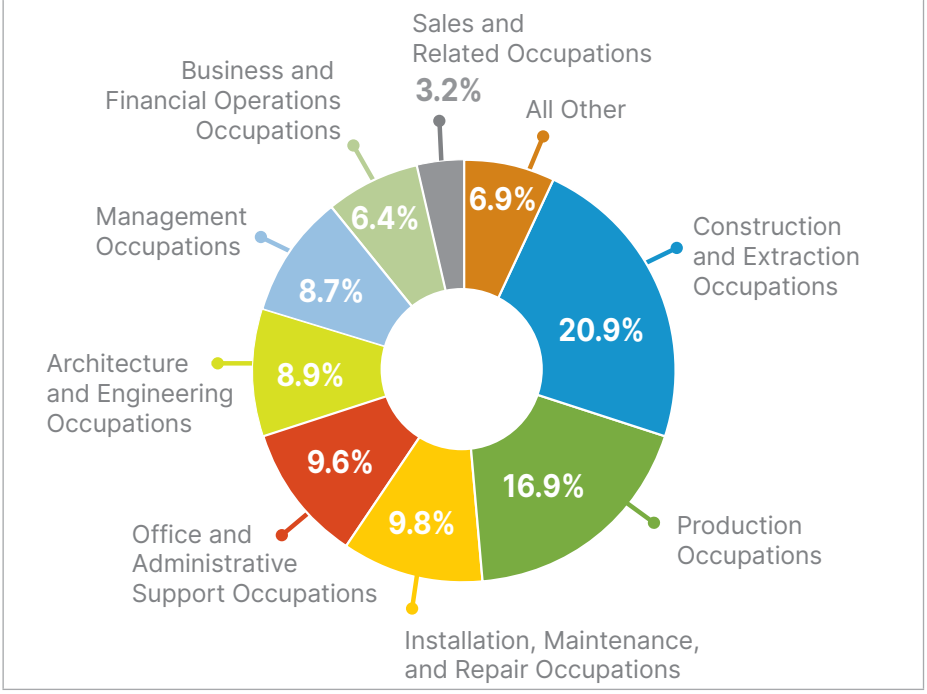
# Impact of New Federal Policies

The modeling of employment impacts in this report is predicated on a continuation of New Jersey's currently supportive climate, clean energy and other green economy policies. This forecast does not include the full slate of economic or employment impacts from either the Infrastructure Investment and Jobs Act (IIJA) or the Inflation Reduction Act (IRA). Both bills will be significant drivers of future job creation for New Jersey's green economy.

As a result of IRA, New Jersey is likely to see faster development and deployment of clean energy and greater investment in green technology in transportation, buildings and other sectors, among many other anticipated outcomes. The IIJA will have a significant impact on grid infrastructure and other clean energy enabling technologies, as well as large investments in clean, safe water, and climate resilience. Discretionary IIJA grant programs may bring additional dollars to New Jersey for solar workforce development, community solar, energy code updates and other initiatives, as well. It is anticipated that these investments will lead to more green jobs in the state in both the near- and long-term, increase access for New Jerseyans to well-paid, family-sustaining green jobs and expand opportunities for organized labor.

These policies and investments build on New Jersey's own ambitious climate actions. New Jersey is already making significant investments in the green economy, driven in part by existing state polices, and much of it aligned with the policy approaches taken in the IIJA and IRA. Forecasting employment and other economic outcomes from this legislation will require a deeper understanding of the specific elements within each bill, and the alignment of those Federal policy and investment impacts with existing New Jersey efforts. The exact detail of how investments will be made and coordinated with existing New Jersey policy is not yet known. Once established, this can be integrated into future phases of green job analysis.

**Figure 1. Distribution of Jobs Created by Occupational Group**



| Table 5. Top Occupations with Projected Job Growth | | | |
|---|---|---|---|
| **Occupation** | **Projected Job-Years, 2022-2031** | **Total Jobs, 2022-2031** | **% of Total Demand Generated by Green Jobs** |
| Electricians | 15,932 | 1,593 | 16% |
| Construction Laborers | 9,565 | 956 | 6% |
| Laborers and Freight, Stock, and Material Movers, Hand | 6,048 | 605 | 1% |
| Structural Metal Fabricators and Fitters | 5,607 | 561 | 60% |
| Inspectors, Testers, Sorters, Samplers, and Weighers | 4,998 | 500 | 8% |
| General and Operations Managers | 4,653 | 465 | 2% |
| Maintenance and Repair Workers, General | 4,537 | 454 | 3% |
| Architects, Except Landscape and Naval | 4,274 | 427 | 27% |
| Helpers — Installation, Maintenance, and Repair Workers | 4,096 | 410 | 26% |
| Office Clerks, General | 4,074 | 407 | 1% |

## Methods

The modeling assumptions used for these economic impact and employment calculations are driven by existing policies and approved programmatic deployment and investment targets, publicly available data on existing projects and assumptions of ongoing expenditure and growth patterns. The outcome therefore is conservative; should there be an increase of investment in these industries, the total expected jobs will increase. The net economic and job creation impacts were developed based on a technology-specific examination of economic costs and benefits to the state of New Jersey within the ten-year study period. More information on the economic modeling outputs methodology can be found in Appendix 1.

# 4 The Need for Action

# 4 | The Need for Action

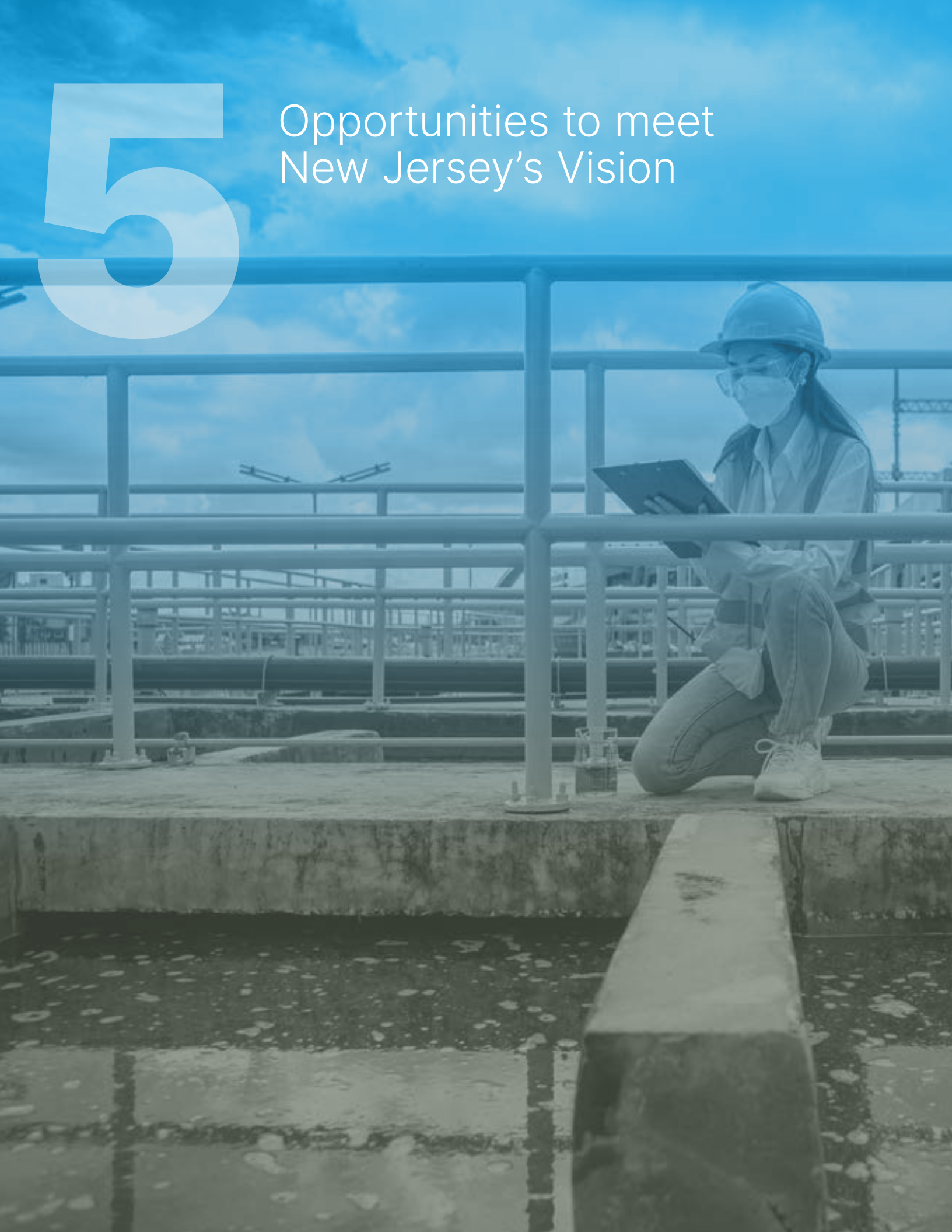
## Conclusions Drawn from the Data

New Jersey has the opportunity to make green job growth transformative for its economy. This growth will build on the foundation laid by current policies, partnerships, and programs. Through its review of the analysis and research, the Council found that:

- If it upholds its strong commitment to existing green policies, New Jersey's green economy will continue to increase the total number of green jobs over the next 10 years. However, without prioritizing programs that respond to New Jersey's goals for a green economy:
  - *There are no guarantees that those jobs will be "good" jobs, or that those jobs will be accessible to all New Jersey residents.*
  - *There is no guarantee that all counties will see positive net growth.*
  - *Workforce development programs may struggle to keep pace with green job creation, resulting in new jobs that are unable to be filled by New Jersey residents.*
- Some sectors, such as offshore wind, energy efficiency, and solar, will grow faster than others. However, without a focus on supporting and developing emerging industries, with a specific emphasis on innovation, manufacturing, and infrastructure support:
  - *Some sectors will miss the opportunity to experience high growth while other sectors will grow slowly or not at all.*
- While the green economy workforce will continue to grow, absent specific programs to promote a diverse workforce:
  - *New Jersey's green workforce will continue to under-represent the diversity of New Jersey's racial and gender demographics.*
  - *New Jersey's green workforce will not be accessible to underserved communities if there are not specifically focused workforce training programs available.*
- Union membership rates will continue to remain stable. However, absent an intentional path forward to meet New Jersey's vision:
  - *Unions will continue to have medium to high membership rates in certain sectors, but there may be missed opportunities to encourage partnerships in workforce development.*
  - *Legacy energy workers will not be connected to targeted training and skills-refinement and less able to access new opportunities.*
- Wages for New Jersey green workers are slightly above the median national average for clean energy workers and are higher than New Jersey's overall median hourly wage. However, absent a focus on supporting wage growth:
  - *Wages in green sectors will not match other energy sectors.*

# 5

# Opportunities to meet New Jersey's Vision



# 5 | Opportunities to meet New Jersey's Vision

The opportunities and recommendations in this report respond to the principles above and have been identified by the Council as necessary to meet the Murphy Administration's vision for a transformative green economy and workforce. Those opportunities are:

## High quality good jobs that are accessible to all

1. **Create High-Quality Green Jobs**
   Create green jobs that are also "good jobs," that offer family-sustaining wages and long-term career pathways.

2. **Prioritize Local and Targeted Job Creation**
   Maximize the benefits from green job growth in local and underserved communities, and populations.

3. **Put All Workers Front and Center**
   Create and maintain pathways to enable legacy energy workers to pursue rewarding careers and high-quality jobs in the green economy.

## A strong, well-trained, and demographically representative workforce

4. **Target Gaps in Workforce Development**
   Target workforce development initiatives to support a diverse pipeline of workers in filling current and future green employment opportunities

5. **Address Needs of Underserved Workforce**
   Focus on wraparound and comprehensive services and support for underserved communities, returning citizens, and all energy workers to broaden the reach of the green economy.

6. **Partner with Unions on Training**
   Partner with unions to improve and expand workforce training for the green economy that also facilitates new entrants from more diverse backgrounds.

## A robust innovation ecosystem

7. **Boost Innovation**
   Grow new green technologies, services, and sectors, centered in New Jersey, through innovation and a supportive ecosystem.

8. **Expand Manufacturing and Supply Chain**
   Anchor manufacturing and supply chains in New Jersey to maximize gains in the green economy.

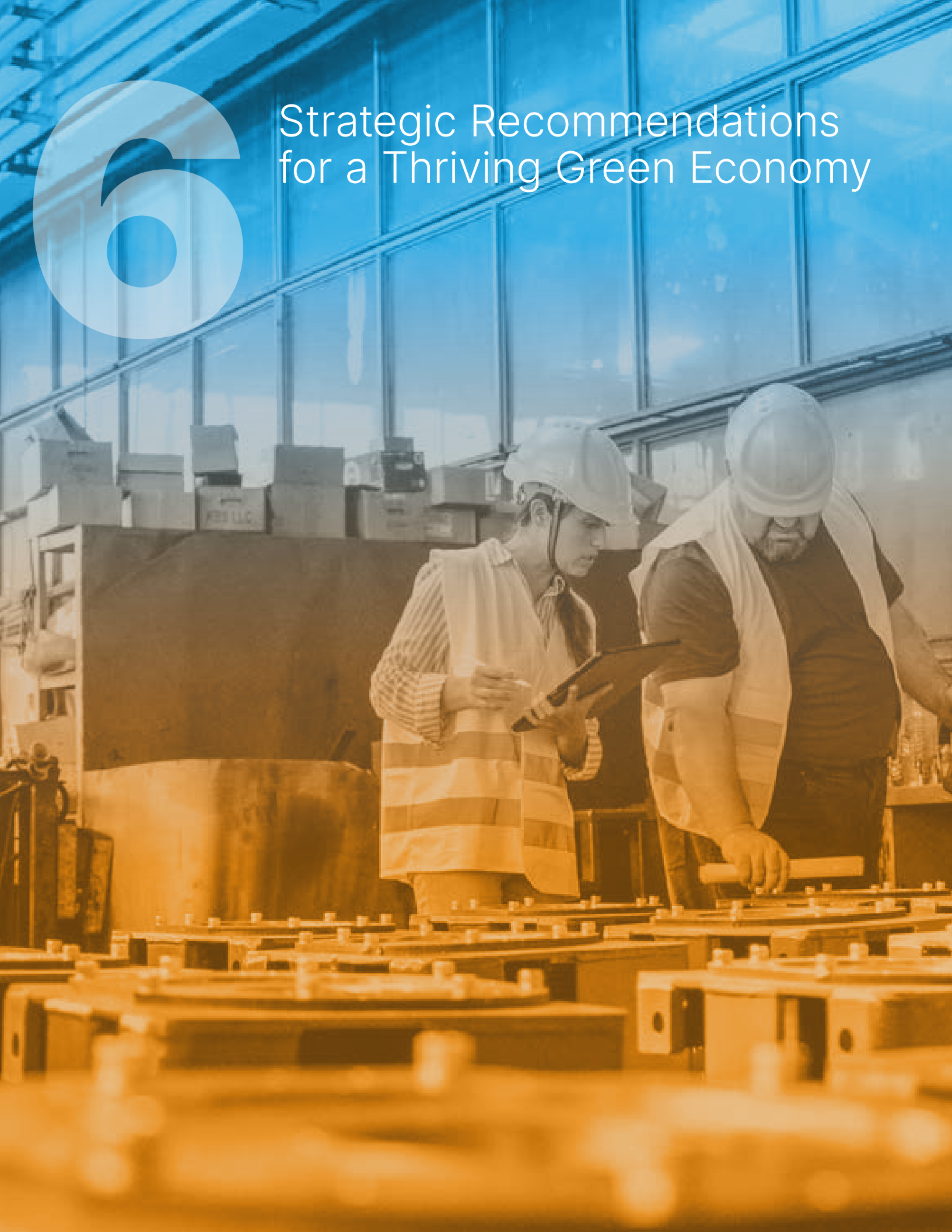
9. **Align with Education Ecosystem**
   Leverage New Jersey's top-ranked education systems to develop the green workers, innovators and entrepreneurs of the future.

Programs and policies needed to realize each of these opportunities are summarized below through strategic and accompanying tactical recommendations. These recommendations build on existing New Jersey capacities and infrastructure in workforce and innovation wherever possible – much of which is more advanced than in other states. Some of the approaches listed are workforce development challenges that are common in other areas as well but have not been addressed or understood in the context of green jobs or the green economy.

Finally, while strategic and tactical recommendations have been organized under a specific opportunity based on the Council's proposed vision for the New Jersey green economy, most are complementary and many times reinforcing of other recommendations in this report.

# 6

# Strategic Recommendations for a Thriving Green Economy



# 6 | Strategic Recommendations for a Thriving Green Economy

## High-quality good jobs that are accessible to all

**OPPORTUNITY 1:**

**Create green jobs that are also 'good jobs,' that offer family-sustaining wages and long-term career pathways**

Job creation in the green economy is foundational to both meeting New Jersey's climate goals, and to supporting equitable economic growth and mobility across the state. While New Jersey ranks in the middle of the pack nationwide for total current green jobs, the investments and policies of the Murphy Administration are laying the groundwork for significant future growth in green jobs. As seen in Chapter 3, New Jersey can expect to see an additional nearly 314,888 net job-years[13] supported over the next 10 years based on current green policies and investments enacted across New Jersey to date. Solar, energy efficiency and offshore wind firms will account for eight in 10 new jobs through 2031. Maintaining and expanding upon these investments and policies will be critical to ensure New Jersey takes advantage of its green jobs potential, especially in rapidly growing clean energy technologies.

Alongside this work, maximizing the number of current and future green jobs as high-quality, 'good jobs' makes the transition to a green economy transformative for the state and its workers, businesses, and communities. Good jobs are defined here as family-sustaining, high-wage, safe, and with a pathway to a full-time career. New Jersey's green jobs tend to be higher-wage and unionized, relative to the national average, but there is room to improve

*"The states that have markets for us will be the states that get the factory".* — CLEAN ENERGY EXECUTIVE

earning potential and maximize union representation in New Jersey's green sectors, which will create pathways to long-term, stable careers and better support workers transitioning into the green sector. New Jersey's investments in green jobs, especially in clean energy deployment, create a significant opportunity for job creation. The State cannot miss the chance to make these high-quality jobs as well.

## What Stakeholders Had to Say:

- **Consistent policies and market signals are key to further expansion of green sectors.** Stakeholders described the importance of policy implementation moving faster for New Jersey to compete with neighboring states. Several saw a need for an influx of funding, especially for alternative vehicle infrastructure and energy efficiency, to meet the ambition of New Jersey's vision.
- **The demand for workers for many green sectors is strong, but there could be a supply issue on the workforce side if more workers are not trained.** Many companies report they are currently struggling to fill technical and white-collar positions.
- **Some newer green jobs are not great jobs yet.** Workforce experts shared that career pathways still need to be developed for many emerging green jobs while others pointed out that there is currently limited earnings potential in a number of green jobs.

### CURRENT APPROACH

New Jersey is supporting green technology deployment through several levers, including 1) policy mandates, 2) financial incentives, and 3) infrastructure and capacity development. These elements are sometimes integrated with job quality requirements, such as prevailing wage standards, project labor and community workforce agreements, and support for unionization.[14]

These deployment policies are critical but when funded by ratepayers, they should be balanced with affordability concerns. While improving the quality of green jobs, it is similarly important to minimize impacts on or disincentives for sector-specific economic development from job quality requirements. There are a number of existing programs that offer incentives for green building standards in LMI housing that align with the market and result in affordable, high-quality development. Where possible, New Jersey should seek an economy-wide approach to ensuring high-quality jobs. Where necessary, New Jersey should provide subsidies or phase in approaches that balance green building and the development of energy-efficient affordable housing with stricter job quality standards.

**Policy mandates** are one of the most effective ways to stimulate green job growth. Policy mandates include renewable generation goals, emissions reduction targets, and energy efficiency standards, such as benchmarking building performance and setting minimum efficiency requirements. With increased sales and deployment and more green projects underway, businesses must hire more workers to build, install, repair, and maintain these technologies.

As part of New Jersey's 2019 Energy Master Plan, the State put forward a goal of reaching 100 percent clean energy by 2050. This will be reached partly through the steps implemented by the Clean Energy Act of 2018, which set standards for energy providers, production of energy, energy efficiency, and energy storage. For energy providers, the State set the Renewable Portfolio Standards that require in-state electricity suppliers serving retail customers to obtain 35 percent of the electricity they sell within the state from qualified renewable sources by 2025. By 2030, the requirement

increases to 50 percent.[15] Other mandates are in place to accelerate the production of electricity through solar and offshore wind technologies. These measures help expand the clean energy market within the state and increase the demand for workers in the green economy. These deployment policies are critical, but when funded by ratepayers, they should be balanced with affordability concerns.

Government-led initiatives regarding current utility usage include mandates to increase annual electric savings from 2 percent to 2.15 percent and natural gas savings from 0.75 percent to 1.1 percent.[16] Increases in energy efficiency and mandates to move away from non-renewable sources are a strong incentive to move towards renewable energy sources that produce green jobs.

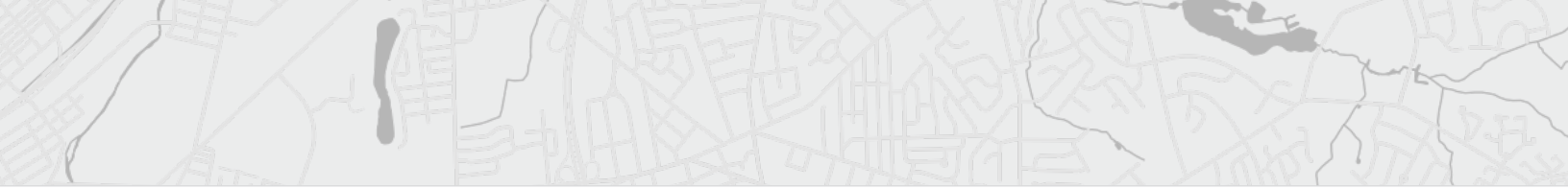
**Financial incentives** can similarly increase the demand for green goods and services, encouraging private parties to invest in the green economy. Incentivizing the uptake of new technologies stimulates job growth. Financial incentives include tax credits, subsidies, rebates, grants, or loans. Without these financial incentives, businesses and residents may not purchase new green technologies or, for example, hire local firms to conduct energy efficiency upgrades, activities which spur the creation of new green jobs in local businesses as they work to meet project demand.

There are a total of 64 financial incentives or regulatory policies throughout the state that support a healthy environment for green technology growth and green job creation.[17] New Jersey has 18 active rebate programs for renewable energy and energy efficiency. There are also personal and corporate tax incentives to promote the growth of the clean energy industry. These incentives, along with the loan and grant programs that the State has implemented, help nurture a strong market for clean energy. A sizable portion of New Jersey's incentives are funded by ratepayers and reinvestments of cap-and-trade revenue.

**Infrastructure development and build-out,** such as grid modernization, charging capacity, transmission and port investments, will be key to further expansion of green technologies. Policies that incentivize or support investments in that infrastructure will have a considerable influence on employment growth in the green economy.[18] Historically, federal and state governments have supported infrastructure expansion through subsidized construction of the nation's canals, railroads, sewage and water systems, ports and shipyards, and highways. In addition to directly funding infrastructure improvements, government can also leverage private investments through the provision of loans, loan guarantees, and lines of credit for infrastructure projects and modernize the federal review and permitting process for construction projects. Job growth in the construction industry is largely dependent on infrastructure development and buildout. Thus, policies that require energy efficiency upgrades, grid modernization, and renewable generation capacity will lead to employment growth in the green economy. This would also create jobs in the manufacturing industry, as large-scale, materials-intensive infrastructure projects also produce supply chain linkages that increase demand from local suppliers and manufacturers.[19]

Funding for community-based clean infrastructure facilities could create employment, improve local industrial competitiveness, and reduce poverty within environmental justice communities. Ørsted has recently been awarded its second offshore wind project off the coast of New Jersey.[20] As part of this second award, Ocean Wind 2, Ørsted has partnered with Zeem Solutions, a provider of e-mobility logistics solutions for fleet operators to deploy 50 Class 8 electric drayage trucks and its supporting vehicle infrastructure.[21] Zeem will also provide mobility training programs for area residents at the Port of Newark and Elizabeth, offering significant investments for New Jersey's overburdened communities. If successful, this program will provide the dual benefits of both reduced air emissions and jobs with appropriate training within the most pollution-impacted communities.

**Job quality requirements** help to ensure that New Jersey residents working in the green economy are paid sustainable wages, which allow them to meet the costs of living in their community. In New Jersey, clean energy jobs earn a higher median hourly wage than the overall statewide hourly wage.[22] However, there can be significant variation in wages paid and career pathway opportunities for different roles within clean energy sectors. Ensuring good job quality with sustainable wages can take several forms. [23]



- *Prevailing Wage & Benefit Standards*: New Jersey has long-standing and nation-leading[24] prevailing wages and benefit laws, ensuring that projects connected to or receiving state and municipal funding and support provide benefits and pay wages established by collective bargaining agreements for that local market.[25] For example, since 2013, New Jersey has required developers of solar projects 1 MW and greater that receive state RECs to pay prevailing wages. More recently, the Murphy Administration signed legislation to ensure Newark Airport workers received prevailing wages.[26]

- *Unionization*: Expanding unions and collective bargaining has been proven to raise job quality standards, as union workers typically earn higher wages and are more likely to receive healthcare and retirement benefits and worker protections. New Jersey has higher-than-national-average unionization,[27] and Governor Murphy is considered a strong supporter of unions, having signed over 40 bills supporting unions into law in his first term.[28] Increasing access to these high-quality jobs to represent the diversity of New Jersey will be critical to maximize the benefits of unionizing the New Jersey green economy.

- *Project Labor Agreements:* Project labor agreements (PLAs) cover all trades workers on a construction project, whether unionized or nonunionized. PLAs set wage and benefit standards and are often used to support higher standards for workers, ensuring that high-wage contractors are hired for environmental infrastructure projects. New Jersey had required PLAs for all public vertical construction projects over $5 million; recent legislation signed by Governor Murphy expands the applicability of PLAs and the requirements within a PLA.[29] The PLA established for the offshore wind port demonstrates the potential scope and criteria of a PLA in New Jersey.[30]

New Jersey's expanded support of clean energy can, with consistent support and implementation, support the growth of significant amounts of new green jobs. The State also has a solid foundation of laws and programs with which to pursue high-quality good job creation in the green economy. The recommendations below seek to build on and strengthen these existing approaches.

### STRATEGIC RECOMMENDATION

**Focus job growth strategies in high-growth-potential green sectors, which are accessible to all levels of workers, while setting standards for wage and other job-quality criteria, in partnership with organized labor.**

### TACTICAL RECOMMENDATIONS

1. **Continue to drive job-creation** through ongoing support and expansion of existing deployment policies for clean energy technologies.

2. **Invest in critical infrastructure** needed for new clean energy technologies (e.g., alternative vehicle supply equipment, battery and other energy storage options, smart grid infrastructure, building electrification, metering.) while maximizing opportunities for federal funding with dedicated capacity and prioritization.

3. **Continue to ensure that high-quality jobs are created** by publicly funded projects by phasing in requirements for project labor agreements (PLAs), prevailing wage, and wage floor requirements for all green contracts that use taxpayer or ratepayer funds; and either leverage existing or provide additional funding, with accountability, to subsidize job quality requirements, especially for small, minority, and women-owned and veteran contractors, and to address any disincentives or economic impacts on development.

*"Creating sustainable business practices includes working within your local economy and trying to keep things home grown".* — COMMUNITY ADVOCATE

**OPPORTUNITY 2:**
**Maximize the benefits from green job growth in local and targeted communities, populations, and businesses.**

Local jobs serve as the backbone of strong communities and local economies. Local workers spend their wages locally, which has additional indirect and induced multiplier benefits. Local workforce development can also bring longer term employment and economic development benefits as the experience and training of a job has been shown to support future higher wages and long-term careers.[31] For the maximum benefits, local job creation should be emphasized in communities that can benefit the most due to their higher existing unemployment rates and underinvestment in critical capacity and infrastructure[32] and to businesses that are less likely to receive funding and contracts. Paying specific attention to this type of job creation and retention can ensure a more equitable sharing of the benefits from New Jersey's growing green economy, close gaps in funding allocations for clean energy expansion, and create stronger communities.[33]

Based on the data in the Green Jobs by County and Technology table, some counties are lagging in green jobs. When compared with the percentage of population in poverty in that county, the counties with the lowest number of green jobs and highest poverty levels include Salem County, Cumberland County, Passaic County, and Mercer County. When considering building local job opportunities, counties with low levels of green job penetration and elevated levels of poverty may be target geographies.

## What Stakeholders Had to Say:

- **Many stakeholders described a need for focused investment and incentives that support local job and small business development by government, utilities, and other stakeholders.** Business owners and trade associations shared that the barriers keeping small businesses and local communities from greater participation in the green economy include everything from the structure of the regulatory system to procurement approaches, to current tax incentive and financing structures. They felt this was especially true in underserved and rural communities.

- **Stakeholders also described a number of opportunities for state government to challenge and address this dynamic** — including financing measures such as bridge loans and initial project funding, updating procurement technologies, marketing programs and services more directly to targeted entities, and better connecting municipalities to state-level work.

**CURRENT APPROACH**
There are a number of approaches that support the generation of local jobs and those targeted to specific populations and businesses within the community. They include 1) Local hiring requirements, 2) Community Workforce Agreements, 3) Partnering with local employers, and 4) Equitable access to contracts. Understanding the context of specific local environments is an important precursor to leveraging these tools.

**Local requirements** that enforce specific geographic hiring targets are a foundational strategy. Best practices include outlining wage requirements and addressing specific populations in need, targeting criteria such as poverty, diversity, and returning citizens.[34] One such existing program is NJ Emerge offered by NJ EDA. NJ Emerge promotes local job creation by offering tax credits to projects that operate within one of the outlined priority sectors, clean energy included, while investing private capital into targeted communities within the state. To qualify for benefits from NJ Emerge, projects are required to create a minimum of 35 new full-time jobs with position-specific prevailing wage requirements and ensure that at least 80 percent of incentivized employee work time is spent within the state. A number of municipalities in New Jersey utilize local hiring requirements.

Additionally, via offshore wind allocation agreements, the State has already outlined requirements for local construction, assembly, and manufacturing, as well as to train and hire local workers for the construction and maintenance of the wind project and a turbine nacelle assembly center to the New Jersey Wind Port.

**Community Workforce Agreements (CWAs), often integrated or built into Project Labor Agreements (PLAs),** can be a powerful tool for local job creation in disadvantaged

communities.[35] CWAs can be mandated by local or state government with legally binding terms. Both PLAs and CWAs set wage and benefit standards and may include quotas for union and local hiring, while CWAs additionally ensure that job creation provides career access and benefits to specific populations, such as low-income or underrepresented communities. One example involves the PLA that is in effect for At-Risk Construction Management Services for the NJ Wind Port Project, which has a community component supporting both diversity and local workforce targets. Hiring targets include 6.9% women and 18% minority workers, with at least 15% of construction management contract value for SMWVBE firms. It also provides resources that prepare women and minority members for apprenticeship programs and outlines requirements for monitoring and public reporting on progress towards diversity goals.[36]

**Community Benefit Agreements (CBAs),** which have a broad focus on communities and are typically negotiated between a developer and community representatives,[37] are typically legally enforceable (although not always)[38] and can be a useful tool for ensuring that community voices are present during project development discussions.[39] In support of CBA development, the NJ EDA has created the NJ Wind Port Diversity and Local Engagement Advisory Committee, consisting of a group of local stakeholders, diverse suppliers, state agencies, and community and commerce organizations. The committee was specifically created to give a voice to equity and diversity issues to aid in the development of Offshore Wind Port projects within the state, ensuring shared community benefits and accessible employment and business opportunities.

**Equitable access to contracts, procurement, and incentives** can serve to support the growth of small, minority, and women-owned and veteran-owned businesses within the state's green economy. Boosting opportunities for these businesses can bolster local communities, increase local hiring (especially in underserved areas), and build wealth for a larger, more diverse population in New Jersey. Technical advice, networking, financial support, mentorship, and other tools can support these businesses in accessing larger contracts, grants, and other opportunities, while being paired with other efforts to ensure equitable access to green and clean energy solutions such as energy efficiency. The carve out for minority and women-owned businesses for the offshore wind port is a recent example supporting this approach.

In addition to the above mechanisms, every project and every community is unique, and research to understand the goals and context of a particular local environment is important. Significant differences in employment rates in New Jersey communities will impact local economic conditions, availability of resources, and social service needs differently. There are broad regional disparities in the state, whether it be urban versus rural environments, north versus south, and so forth. COVID-19's economic impacts could further exacerbate these differences if the economic and

*"Procurement practices are an under-utilized way of creating jobs."*

— GOVERNMENT AGENCY EXECUTIVE

employment dislocations become permanent. Many community-based organizations and local workforce development agencies are well-suited with local expertise, networks, and trust to take a leadership role in supporting this type of research, provided they can secure appropriate funding.

The 2020 NJ Clean Energy Act prioritized inclusion of underserved communities and equitable access to clean energy programs, energy savings, and job opportunities. From this act, the NJ BPU created the Office of Clean Energy Equity (OCEE) that oversees the deployment of clean energy programs and projects. In 2021, the NJ BPU also approved the redesign of the state's Community Energy Plan Grant Program to consist of a greater emphasis on equity, overburdened municipalities, and a reduction in barriers to clean energy program use. This included an increase to $25,000 in grant awards allowed to municipalities identified as overburdened, up from the $10,000 awarded to all generally eligible municipalities across the state. Such communities are now also eligible to receive enhanced support via technical assistance for plan creation and submission.

**STRATEGIC RECOMMENDATION**

**Ensure that state policies and programs incentivize local and targeted job creation, especially in underserved communities.**

**TACTICAL RECOMMENDATIONS**

1. **Encourage local job creation,** in partnership with community and workforce development agencies, through a requirement that all clean energy projects (used to achieve statewide clean energy targets) make a good faith effort to hire qualified local workers.

2. **Change weighting criteria in competitive solicitations** issued by the State to include community benefit agreements, and prevailing wage/wage floor requirements, paired with additional strategies to support and encourage participation by SMWVBEs (Small, Minority, Women, and Veteran Owned Business Enterprises).

3. **Create an open-source framework for community workforce agreements** (CWAs) and community benefits agreement (CBAs), available to all New Jersey stakeholders.

4. **Ensure energy efficiency investments in low-income and multi-family housing support local hiring and contractors** through additional incentives and financing that supports utilizing local and SMWVBE energy efficiency contractors and training and employing local residents.

5. **Ensure greater inclusion of SMWVBEs in local and state procurements** by encouraging bidders to make good faith efforts for for inclusion, accompanied by technical assistance, access to low-cost capital, and network development and monitoring of outcomes, offering preference to those operating and hiring in underserved communities, veterans, and legacy energy workers.

**OPPORTUNITY 3:**

**Create and maintain pathways to enable legacy energy workers to pursue rewarding careers and high-quality jobs in the green economy**

While establishing entry points for new businesses and industry sectors to create jobs is vital to New Jersey's transition from a fossil-fuel-based economy to a green economy, this transition will not be successful unless workers – especially those who may be displaced – have access to the critical training needed to excel in these jobs.

The transition to a green economy cannot come at the expense of legacy energy workers whose efforts helped build a thriving economy. As New Jersey grows its green economy, it cannot assume automatic entry of these workers. The state must rise to the challenge of ensuring they can continue to play a central role in New Jersey's clean energy future. They must be connected to targeted training and skills-refinement programs and provided pathways in new fields.

New Jersey's economic evolution presents great long-term opportunities for the state's economy and workforce. Bringing together industry partners, energy workers and organized labor, communities, and other connected stakeholders in good faith and on common ground to forge best practices will generate the early successes from which future accomplishments will flow.

## What Stakeholders Had to Say:

- **Several stakeholders highlighted the benefits of developing a comprehensive transition plan for all New Jersey workers**, which would assess the types and number of job transitions and how best to support displaced workers, businesses, and communities.

- **A number of near-term opportunities were surfaced as initial steps,** including working more closely with utilities, impacted communities, and displaced workers, exploring opportunities to leverage existing New Jersey infrastructure, developing clear transitional career pathways, and creating a broad stakeholder table to address the most complicated issues.

**CURRENT APPROACH**

A key element to green transition policies is the inclusion of worker supports and workforce investments during the period of transition, alongside community-level strategies and provisions, such as access

*"We need to have a plan for the future."* — UNION REPRESENTATIVE

to capital and incentives for local business startups or business attraction efforts. As New Jersey transitions from a fossil-fuel-based economy, workforce development policies will need to connect legacy energy workers to long-term, sustainable career pathways. Also important is significant partnership and relationship-building across educational institutions, industry, labor, and community organizations to develop the appropriate, community-centric solutions that consider the realities of each region.

To date, New Jersey does not yet have a region- or state-level transition report or framework and has not completed necessary research to understand the workforce scope and needs or assembled the necessary stakeholders to address an evolving energy landscape. The creation of the Council on the Green Economy is one step towards a transition plan. A transition plan with proper short-term and long-term goals and recommendations can strengthen and diversify the green workforce and ensure an inclusive transition for all affected workers.

A transition plan should develop and support, through public and private employment service providers, tailor-made training linked to specific occupations and high-quality job opportunities in the green economy. Following a comprehensive understanding of local labor market dynamics, partnership and engagement between industry, labor, community, utility, and other stakeholders is crucial. Successful workforce development programs and systems involve employers, workers, unions, and community leaders at the outset of planning. These links are critical to sharing ideas and best practices and buy-in. Future research and planning should center on how to build high-quality green jobs and ensure full access and career transitions for all willing energy workers, with a specific focus on wage parity, opportunities to move up the career ladder, long-term sustainability, training, and support gaps and solutions.

Transition plans are being implemented internationally across Europe and Canada and across states in the U.S., including Colorado, California, New Mexico, and the Appalachian states, among others. In addition to some of the individual worker-level supports mentioned above, Colorado's Just Transition Action Plan also includes community-level strategies and provisions, including access to capital and technical supports to encourage local business startups or expansions and incentives to attract other new businesses to the region.[40] An important focus area for Colorado's Action Plan is in the *quality* of jobs created, not just the quantity. Additionally, major areas of focus across many state-level transition plans include significant partnership development efforts that leverage expertise across educational institutions, industry, labor, and community organizations to develop the appropriate, community-centric solutions that consider the realities of each region.

Illinois has also been a leader on implementing a transition to clean energy with its 2021 Clean Energy Jobs Act.[41] The bill includes an investment for up to $40 million per year to replace lost property taxes, and support economic development and job training. It also creates a "bill of rights" for displaced workers and provides them with services and training.

### STRATEGIC RECOMMENDATION

**Bring together agencies, industry, utilities, organized labor, communities, and other stakeholders to develop a comprehensive transition plan, backed by significant research, which leads to well-funded targeted supports for workers, communities, and unions impacted by the transition from a fossil-fuel-based economy, to put worker voices and livelihoods front and center.**

### TACTICAL RECOMMENDATIONS

- **Create a new, or leverage an existing, transition working group with directed outcomes**; working group should include affected workers and stakeholders including BPU, utilities, ratepayers, unions, businesses, and other stakeholders to establish a) a process to identify new business models for New Jersey utilities that assesses and addresses workforce and training needs and requirements, and b) a clearly defined "transition" report of topics, challenges, action items, and responsible agencies.
- **Explore the creation of a fund** to provide resources and support to those impacted by any transition from a fossil-fuel-based economy, including workers, their families, and communities; begin by researching resources and partnerships required.

# A Strong, Well-Trained, and Demographically Representative Workforce

**OPPORTUNITY 4:**

**Target workforce development initiatives to support a diverse pipeline of workers in filling current and future green employment opportunities.**

New Jersey has a diverse network of training providers and career navigation support systems and a highly educated workforce. Interagency and industry-wide collaboration on workforce development targeted for the green economy can bring together the many entities working and making progress towards the same goal and maximize funding streams, training programs, and communications.

## What Stakeholders Had to Say:

- **A number of stakeholders talked about the importance of increased funding and prioritization for workforce training for green jobs, including being explicitly set as a goal or requirement with clear directives for government programs**. Others described the importance of coordination on and communication about training program design, outcomes, and funding that is targeted towards the green economy**.**
- Stakeholders share that **the training and education systems are not bringing forward the quality of workers needed across the economy** (including for green sectors)**.** Most stakeholders feel that workers of all levels and backgrounds, but especially younger ones, are lacking critical skills necessary for success – including direct experience, math, and, by far the most prominent complaint – a lack of soft skills.
- **Many stakeholders described the value in broader, better-defined pathways to apprenticeships and pre-apprenticeships**, which includes focused outreach working with communities and organizations to recruit candidates from underserved backgrounds and providing income and other cost supports to trainees and apprentices.
- **Companies can be important allies, which is a common opportunity in workforce development, but especially important in emerging green sectors with new companies and a chance to change business as usual.** Three options consistently raised included supporting company partnerships, establishing more standardized, credentialed training programs and redefining training programs to integrate real-world and business aspects, and soft skills.
- **It is a puzzle in general for the New Jersey resident to find information that benefits them about the emerging green economy.** There is not an easy way for anyone who needs answers to questions as they navigate the system and not enough awareness of the green economy, especially in underserved communities. The State could improve its marketing and outreach for the opportunities and resources available with green jobs, targeting a range of audiences, including small businesses, contractors, parents, local residents, and students.

**CURRENT APPROACH**

Key methods to strengthen a local workforce in New Jersey are 1) public policies, 2) training and education, and 3) career navigation supports.[42] These are critical components to any strong regional workforce development ecosystem. These methods, or strategies, are crucial because they lead to the creation of a comprehensive and cohesive workforce development system that produces and supports the well-trained workers required to fill green job openings. It is important to note that workforce development strategies are not exclusively focused on training and education but include many other elements of worker support.[43]

**Public policies** to support workforce development include federal- or state-level workforce plans and policies, transition policies and reports, and tax incentives or subsidies for businesses to create internships and apprenticeships for green jobs. Public workforce planning is used to identify and plan for projected future gaps in labor supply and

*"Training and workforce development need to expand beyond solar and wind to emerging fields. We need to prepare for jobs of the future such as those related to resiliency, EVs, electrification, heat pumps and so on. Training needs to be developed for all of them."* — BUSINESS ASSOCIATION EXECUTIVE

demand. Other government-led workforce policies direct funds to, and create organizations that connect, jobseekers to employment or training opportunities. Other policies or reports similarly provide financial or resource support to workers in declining industries, offering stipends for upskilling or reskilling and connecting these individuals to new employment opportunities. State governments can also fund programs that subsidize green employment internships at companies in New Jersey, engaging and incentivizing local green businesses to hire and train the next generation of workers for the green economy.

New Jersey Department of Labor and Workforce Development (NJDOL) offers a wide range of grant opportunities to strengthen New Jersey's workforce. One example where NJDOL is strengthening the green workforce already is the $4.0 million Growing Apprenticeship in Nontraditional Sectors (GAINS) career program, which seeks to expand existing United States Department of Labor registered apprenticeship programs, establish apprenticeship programs in high-growth occupations, sectors, and industries[44], and support workers and businesses who have been adversely affected by the COVID-19 pandemic.[45] NJDOL will provide a 50-percent wage reimbursement for up to 12 months of newly hired apprentices to encourage program participation. Applicants for the program will receive greater weight of acceptance if they recruit apprentices who are dislocated workers, workers impacted due to COVID-19, women, members of a minority group, vocational school participants, K-12 students and post-secondary students, Veterans, or persons with disabilities, as well as apprentices who are within sectors/occupations of high growth. Through the GAINS program, apprentices are required to undergo yearlong on-the-job training and related technical instruction, while earning a minimum of $16.00 per hour. This type of program can strengthen the green workforce in New Jersey by subsidizing employers to train possible clean energy workers.

**Training and education** includes apprenticeships, internships, vocational technical training, earn-and-learn models, on-the-job training programs, and degrees and certification programs that result in skills and qualifications that prepare individuals for new green jobs. Holistically, these approaches are crucial elements that collectively support the development of a strong and resilient workforce.

Green job-specific training in New Jersey is mostly found in more generalized training programs. At the state level, the New Jersey Department of Labor oversees a number of workforce programs – ranging from training and education to grant funding for private and non-profit participants to oversight of county one-stop hubs for job placements. Green jobs training is integrated into those initiatives rather than operating as standalone programs. Cities and counties and their workforce agencies and educational institutions further add resources and capacity for general workforce training.

One example of training and education currently being executed in New Jersey is the WIND Institute. On August 16, 2019, Governor Murphy issued Executive Order No. 79 to establish the Wind Council, an intergovernmental coordinating effort to develop a plan for creating the Wind Innovation and New Development (WIND) Institute, which will serve as a center for education, research, innovation, and workforce

training related to the development of offshore wind in New Jersey and the Northeast and Mid-Atlantic region. To inform its recommendations, the Wind Council assessed the state of the offshore wind industry in New Jersey, conducted a gap analysis of workforce assets in New Jersey, and facilitated discussions with a range of stakeholder groups, including offshore wind industry members, organized labor, four-year colleges and universities, community colleges, vocational technical schools and comprehensive high schools, and commercial fisheries. The data and insight gathered throughout this effort reveals a strong need for an entity that will play a coordinating role within the Northeast and Mid-Atlantic's offshore wind industry that catalyzes workforce development and research, innovation, and thought leadership efforts. Addressing pressing workforce development needs and fostering local research, innovation, and thought leadership will require collaboration across organizations. The Wind Council believes that the WIND Institute will be instrumental in organizing and developing solutions that engage all stakeholder groups to further New Jersey's leadership in offshore wind.

Another example can be found in the New Jersey Department of Environmental Protection, which launched its Youth Inclusion Initiative in Summer 2021 as part of the New Jersey State Park Service's workforce development program, and expanded it in Summer 2022 to nearly all Department programs. The initiative seeks to provide young adults, ages 17 to 24, opportunities for exposure and to develop some technical skills necessary to pursue a career in the environmental field. The Initiative places a particular focus on providing opportunities to young adults from communities that have disproportionately less open space or historically lack natural lands access. The department partners with local organizations to build a curriculum, where the organizations provide supervision, professional development, and logistics, and the DEP provides staff to train on the high-level technical curriculum.

Other sources of training include non-profits which tend to focus on hard-to-reach communities, and populations facing significant barriers to access. Unions have extremely vigorous training programs, but many stakeholders describe the difficulty in entering unions at the pre-apprenticeship or apprenticeship stage. Companies, especially larger ones, have in-house training efforts, which range in scope and complexity from a few days to multi-month. Stakeholders describe these efforts as not well integrated into larger New Jersey workforce goals.

**Partnering with employers** can bring many benefits. Large companies can be good partners with which to develop partnerships with third party recruiters for companies that know their human resource needs. Small businesses are also crucial partners, and they report that they can struggle to leverage incentives and financing, build training programs, pursue new growth opportunities, and otherwise engage in the green economy. This applies especially to MWBEs and within historically underserved communities.

To maximize these partnerships, the first task is to understand which employers can participate in these programs, which includes direct marketing to involved employers or to business associations and intermediaries. Reaching employees can be a challenge – requiring a campaign mindset and locating the most relevant and business-trusted partners. Another component is education of employers about apprenticeships and their value, other training opportunities, key agencies to work with, and so forth.

*"There are many individual entities working and making progress towards the same goals but not organized or coordinated from an interagency and industry-wide collaboration perspective to maximize opportunities within the state."*

— WORKFORCE BOARD EXECUTIVE

**Career navigation supports** assist workers in navigating the green labor market and achieving career goals through interview training, resume development, career planning and coaching, network building, and any other support mechanisms that help a jobseeker navigate the employment landscape. Schools and training programs play a pivotal role in career navigation by helping students identify their interests and strengths and connecting these to growing industries or jobs in a region. Career navigation can be applied from kindergarten through high school, especially for emerging new green careers that are not yet widely known or considered as viable pathways to sustainable employment.

Many of New Jersey's career navigation support systems described below are not necessarily aimed at the green economy and green jobs. However, with the infrastructure and organizations already in place, these tools could be repurposed to support green career education and navigation as well.

New Jersey offers many navigation resources through a patchwork of entities and organizations spread across the state. There are 30 New Jersey Career Centers in multiple cities, including Franklin, Plainfield, Elizabeth, Phillipsburg, Flemington, and Passaic. These career centers provide a range of services, including career skills training, certifications, and mentoring. A career center in Millville, New Jersey currently offers career navigation support and certification/ training for the following four sectors: Computers and Information Technology, Office Administration, Medical Office Administration, and Business Applications.

*"The most beneficial thing an employer can do is to reach out to their local county vocational training program."*

— COMMUNITY ADVOCATE

One-Stop Career Centers, sponsored by the Department of Labor and Workforce Development, are also located across the state. Services include virtual workshops, job search assistance, job referrals, re-employment support, one-on-one career planning, career training assessment and referrals, and job development.

Additionally, the New Jersey Business Action Center (NJBAC) provides a conduit to businesses. They use a weekly newsletter to reach an extensive network and inform them on what opportunities are available in the state. Their website's "live chat" feature allows individuals to receive business-related assistance quickly and directly. At the same time, the Office of State Planning (OSP) is the conduit to municipalities. They host robust training programs at the local level for resources released by the State. The OSP also released a newsletter highlighting trainings, grants, and programs available in the state.

### STRATEGIC RECOMMENDATION

**Align government agencies on green workforce development that maximizes employment across underserved populations, emphasizing filling near-term available jobs. Address root causes of workforce skill gaps, in partnership with employers, agencies, training providers, and other critical stakeholders.**

### TACTICAL RECOMMENDATIONS

1. **Develop a centralized online collection of resources,** through a third party or vendor, in conjunction with all relevant agencies and other stakeholders, which houses all existing green training programs, open green jobs, and skills-based career pathway maps where all workers can learn about these fields, find opportunities for upskilling or re-skilling and be connected to potential employers and new job opportunities; provide funding for ongoing upkeep and updates to site.
2. **Conduct a workforce needs gap analysis for current and future projections of jobs** specifically for the New Jersey green economy that includes skill transferability research specific to New Jersey's labor market in legacy energy industries.
3. **Better understand access to and availability of existing high-quality jobs** in growing and established sectors connected to the green economy (e.g., the utility sector) and actively support workforce pathways among different populations to reach them.

4. **Expand paid pre-apprenticeship and apprenticeship programs,** such as NJBUILD, directly focused on the green economy, with integration of wraparound services, and supporting participants with cash stipends. Explore how to better engage entry-level, lower-skill workers in these pre-apprenticeship positions and market these programs to employers.

5. **Convene and establish connection points with green and clean energy employers** educating them about opportunities and funding to pursue greater career advancement and training in green jobs; include community organizations to develop a matching system to ensure all currently open job, internship, training, and apprenticeship positions in the green economy are filled with a substantial fraction taken up by persons from underserved communities, veterans, the re-entry population, and legacy energy workers.

6. **Build greater employer/training provider partnerships,** leveraging the knowledge of key stakeholders like unions and utilities to develop paid on-the-job training modules, internships, apprenticeships, or mentorships in green sectors, coupled with dedicated wraparound services.

7. **Raise awareness among jobseekers (and parents of future jobseekers)** by leveraging marketing, communication, and distribution networks to share information on green training resources and new career opportunities. Target outreach to underserved communities, legacy energy workers, the re-entry population, and veterans.

### OPPORTUNITY 5:
**Focus on wraparound and comprehensive services and support for underserved communities to broaden the reach and positive impact of the green economy**

Centering equity and diversity in the implementation of New Jersey state programs represents core values of the state. As seen in Chapter 3, although women make up over half of New Jersey's labor market, female workers account for only 17 to 28 percent of green jobs. Black workers account for almost 16 percent of all workers in New Jersey yet represent only nine to 10 percent of green jobs across the state. Building on the policies already initiated under the Murphy Administration, there is an opportunity to continue expanding workforce access to green jobs for all workers in New Jersey. Investments in wraparound services are also important for underserved populations and communities to address intersectional barriers to employment such as access to transportation, broadband technology and software, quality education, language translation, and childcare.

*"A focus on economically depressed regions is needed. That's where the need for jobs and economic activity is the greatest. Target them first."*

— ENVIRONMENTAL JUSTICE LEADER

### What Stakeholders Had to Say:

- **Reaching underserved populations and communities across the state requires changes to policies and support systems that address racial inequity and legacies of injustice.** This includes strong and consistent investments for job readiness and workforce development in low-income and environmental justice communities, rural areas, and underserved regions in South Jersey.
- **The importance of tracking retention and advancement of workers of color** alongside hiring was raised several times. State agencies should require this data, especially from companies receiving incentives, to ensure initial hiring is leading to careers, especially in entry-level roles.
- **Community-based organizations are an important but underutilized resource** with the local knowledge and networks to address barriers to recruiting diverse candidate pools and more generally reach underserved community members about the green

economy more directly. However, this insight was consistently coupled with recommendations to provide additional funding, training, technical assistance, and other capacity.

- **Creating opportunities for the formerly incarcerated who are re-entering the workforce** was a focus of many stakeholders. There are a number of policies and laws that restrict hiring of these workers for green jobs at the local, state, and federal level which need to be better understood, at the very least. Other ideas included engaging current inmates prior to re-entry and developing partnerships with existing re-entry organizations as an optimal way to leverage existing capacity.
- **Targeting veterans for green jobs** was a priority of several stakeholders and requires focused outreach and clearly defined skills transfer pathways. There was an acknowledgement of the lack of current capacity and knowledge to connect military skill sets and clean energy industry skill sets and a general lack of awareness in the veteran community about green job opportunities.
- **There was unanimous consensus on the need for more wrap-around services and other resources to support hard-to-reach and entry-level workers from underserved communities.** A host of needs to address were surfaced including child-care, especially for single parents, access to computers and broadband internet, access to transportation and a driver's license, language training, limited mentorship, and soft skills. Funding for existing or new programs connected directly to green jobs training programs is an important first step.

**CURRENT APPROACH**

To ensure that underserved communities are included in the benefits of the green economy, the state, employers, philanthropy, and industry can build on existing efforts and initiatives that include: 1) carving out resources specifically for this purpose, 2) engaging with local organizations and communities, and 3) providing wrap around services to overcome barriers preventing employment at good, green jobs.

**Carving out dedicated funds** can stimulate the inclusion of underserved communities into the green economy, to advance small, minority, women, and veteran led-businesses, and are necessary to provide the proper workforce development tools and supports to make jobs in the green economy accessible to those who have previously been excluded. Resource needs range from significant investments in infrastructure (such as transit or broadband) to on-the-ground recruitment, screening and job placement supports to wraparound services such as transportation, childcare, and language-accessibility (discussed below).

One leading example in New Jersey is the Pay It Forward Program, administered by a number of state agencies and the New Jersey CEO Council.[46] This program provides interest-free and fee-free loans from a revolving fund (that will recycle student repayments to finance future cohorts), as well as wraparound services, to support low-income and otherwise disadvantaged New Jersey career seekers participating in approved training programs.[47] This program is specifically targeting occupations in health, with some pathways for IT and clean energy, although as the green economy continues to build out, opportunities exist to target more areas in clean energy technologies and services.

**Working closely with communities** and representative organizations to develop long-term constructive relationships and opportunities can support the design of locally appropriate workforce development and job creation programs. This includes developing programs that ensure the voices of those who live in these communities are included in the design process.

One example of the work New Jersey is doing on this front is the Community Collaborative Initiative (CCI) established by the Department of Environment Protection, a place-based partnership that promotes quality of life in New Jersey's underserved communities. CCI aligns interests that support environmental and community revitalization, equitable economic development, and enhanced public health outcomes, emphasizing engaging the community as a partner.[48]

Another example is the Equity Working Group established by the New Jersey Board of Public Utilities (BPU) to inform the rollout of new utility-led programs in energy efficiency. The Equity Working Group is focused on issues specific to LMI (low-to-moderate income) and multifamily residency communities. This group also looks at supplier diversity among companies who win

EE program contracts. It features representatives from relevant stakeholder groups and hosts regular public meetings.[49]

**Wraparound social services** include transportation solutions, access to family and childcare, housing subsidies, counseling, financial literacy education, and income support. These types of supports are often referred to as "wraparound services" because they focus beyond training and education to provide full support to workers in other areas of life that may affect their ability to access training or job opportunities.

New Jersey has an ecosystem of organizations that provide wraparound support services that will need additional funding to focus on supporting the green economy. Wraparound services will be important when building a transition report referenced in Opportunity 3, as wraparound services such as income support, counseling, and transportation stipends will be especially relevant for legacy workers in fossil-fuel-based industries.

Wraparound services for returning citizens are also critical in transitioning to new industries in the green economy. One example is the Governor's Training, Reentry & Employment Center, which opened in April 2021 in Kearny, NJ with support from Wendy Neu, CEO of Hugo Neu Corporation.[50] NJDOL and its accredited training vendors, in partnership with the New Jersey Reentry Corporation (NJRC) and other private business partners, will provide substantive apprenticeship training for those formerly incarcerated. NJRC participants will receive training in six major certification skill sets including solar technology, construction, automobile mechanics, and remedial education, coupled with private access to telemedicine and medication assisted treatment (MAT). Training could be further expanded to other emerging green technologies, such as offshore wind and alternative vehicle technicians.[51]

*"There is no need to recreate the wheel; instead, look for partnerships to leverage the work already being done."*

— GOVERNMENT AGENCY STAFFPERSON

New Jersey also has programs specifically geared towards youth and young adults that offer job coaching and awareness raising for the green careers. Wraparound in New Jersey provides funding for young adults who are aging out of foster care to learn life skills and transition into independence.[52] These funds can be used to cover rent, food and supplies, or driving lessons. Another program, Youth Employment Services, is available to Hunterdon and Somerset County residents who are between the ages of 16 and 24. The program assists individuals in finding employment and training opportunities by working one-on-one to help individuals reach their full potential and independence. Case managers support young adults in identifying their career goals and developing strategic action plans.

### STRATEGIC RECOMMENDATION

**Increase accessibility to green job pathways for underserved and historically disadvantaged populations through new policies that support paid pre-apprenticeship and direct employment opportunities, and robust investments in comprehensive wrap-around services.**

### TACTICAL RECOMMENDATIONS

1. **Boost investment in support of the green economy, specifically in underserved communities,** to address the mismatch between local investment and available workers and make green jobs more accessible to these communities.
2. **Expand on and promote existing vocational reimbursement programs** that help companies fund internships and apprenticeships in green sectors, targeting veterans, underserved communities, and legacy energy workers.
3. **Expand the "Pay It Forward" program to expand into green training initiatives** for already-employed green workers to gain skills/certifications to move up the career ladder.
4. **Develop a comprehensive wraparound services strategy** for state workforce development programs that provides mentorship through career coaching, mental and emotional support, language training, and remedial education, and programs that support physical

access and flexibility to include remote and online training options and provide transportation and affordable family care services.

5. **Explore and identify transportation barriers** that limit accessibility to work or training sites; in partnership with industry, **assemble a stakeholder worker group that will develop transportation solutions** for workers in training or entering employment.

6. **Target specific support for the re-entry workforce population** by a) working with federal and state agencies to review regulations regarding hiring of formerly incarcerated workers and contractors; b) engaging and supporting existing community organizations to develop training programs specific to needs of returning citizens; c) offering green training programs to current inmates who are nearing release, and d) developing wraparound services specific to this population.

7. **Provide resources to Community-Based Organizations** (CBOs) to provide wraparound services and incentivize private companies to hire CBOs to provide these for green training opportunities.

### OPPORTUNITY 6:

**Leverage existing best-in-class labor union training for the green economy and focus on expanding access and capacity, particularly in the construction trades.**

Union-supported training programs can help build the high-skilled labor workforce needed for the green economy. The building and construction trade unions in particular offer members specialized, fully funded training pathways that lead to steady careers with family-sustaining wages and worker protections.[25] These apprenticeships can provide a top-notch New Jersey green workforce. These training programs can be especially transformative for New Jersey's green economy if they also ensure equitable access to those programs. Increasing access to, and the number of, these competitive apprenticeships could offer stable pathways for high-quality jobs for underserved communities and people of color.[27] This includes addressing systemic barriers to employment beyond the control of unions and getting more individuals ready to enter apprenticeships.

Unions also need a clear and predictable understanding of the jobs being created in the green economy that will require or benefit from apprenticeships. Because of the long-term nature and value of union membership, building and construction trade unions must match the supply of future union workers, via apprenticeships, with demand for those workers. Establishing clear, reasonable, and agreed-upon expectations for the future green jobs that will be open to unions will allow labor unions to offer new apprenticeship opportunities.

## What Stakeholders Had to Say:

- **Maximizing the opportunities for partnership with organized labor will require active engagement.** Many recognize the importance of labor unions in providing highly trained workers. But some unions are concerned about the green economy and don't have clarity on future openings to train their workforce and establish job classifications between unions. Open dialogue between unions and many other stakeholders will be critical to build trust with unions. Stakeholders emphasized that for the green economy to thrive, different sectors such as fossil fuels, clean energy, labor, and business must engage in meaningful and forward-looking dialogue. Also, union members needed to understand how to engage with the green economy.

- **Several stakeholders talked about the importance of building a "commonality of understanding" between unions and other groups around how unions can be supportive in addressing equity issues.** The issues surrounding access to union apprentice programs, importance of training program requirements, and the role unions can play are complex. Opening new pathways into unions was a crucial step forward for many stakeholders.

### CURRENT APPROACH

To maximize the opportunities and value in partnering with unions on workforce training, New Jersey can continue to support union training programs through the following means: 1) clarifying workforce and training needs for the green economy and to help unions identify upcoming opportunities, 2) facilitating partnerships between unions and other stakeholders to address education and other union entry barriers, 3) helping unions reach new apprentices in underserved communities, and 4) investing in apprentice candidates to ensure they have the background and readiness to

take full advantage of new openings.

**Clarifying workforce and training needs** can help unions and workforce development partners and intermediaries working with them in planning for the future. These include calculations of future employment opportunities, skill-specific need (including licensing and certification), skill gap analyses, and other items. It also includes policy and programmatic analysis to determine the relative impact on demand for union workers. These are currently lacking in the clean energy sectors for New Jersey, especially in new fields such as storage, grid infrastructure, and offshore wind. This information can help identify pathways to unionize jobs, help unions see opportunities for growth of the union workforce, and allow unions to begin to plan for worker demand increases (and future apprenticeship needs).

**Partnerships that address union entry barriers**, with unions at the center, have been a best practice in other states (such as California's High Road Training Initiative).[28] A myriad of relevant training partners and stakeholders must be brought together to address the complex workforce development challenges at the center of transitioning to a green economy.[29] These partnerships must include schools and those developing curriculums. Building and Construction Trade Union requirements for apprentice proficiency in specific subjects and skills, such as construction-related mathematics, is not a focus of standard school curriculums. Emphasizing construction-related examples and real-world instruction, starting with young students, will allow apprentice candidates to build the necessary skills and knowledge. Further remediation for those outside of schools can be supported in the public workforce system, adult basic education, and community colleges.

**Tools and programs targeted to reach new candidates in underserved communities** can expand pre-apprenticeship access and opportunities. Unions have an emerging track record in reaching underserved communities, especially within service-sector unions, which can be built on.

**Investing in future apprentice candidates** ensures that a wider range of individuals, especially from underserved communities, have the background and readiness to take full advantage of future apprenticeship openings. As stated, preparation for entry into the building and construction trade unions can require math competence and other educational preparedness and soft skills, and basic construction skills, as well as a driver's license and ability to travel. State investments can serve as a valuable tool to begin remediation.

### STRATEGIC RECOMMENDATION

**Work with unions to provide and expand apprentice training programs in the green economy.**

### TACTICAL RECOMMENDATIONS

1. **Conduct research on workforce training and licensing needs** in green sectors to provide unions with predictable pathways.
2. **Identify opportunities to create pre-apprenticeships** that best support students and candidates with the specialized training and curriculum needed for specific trades.

*"Labor unions have the resources to support the skills and services needed for the transition to the green economy. However, they are wary of next steps. Building trust with unions is a long-term game."*

— UNION MEMBER

3. **Support union efforts to continue to expand access to union apprentice programs.**
4. **Invest in addressing immediate barriers to apprenticeship and pre-apprenticeship entry** including a) creating remedial education programs that are contextualized and targeted to union apprenticeship entrance exam requirements, b) developing learn-and-earn apprenticeship readiness programs that provide basic construction skills as well as educational preparedness for union apprenticeship entrance exams, c) developing programs and policies that encourage aggregating work activities to increase union participation.

# A Robust Innovation Ecosystem

**OPPORTUNITY 7:**
**Grow new green technologies, services, and sectors, centered in New Jersey, through innovation and a supportive ecosystem.**

A thriving innovation ecosystem is foundational to supporting new green industries and technologies that will maintain New Jersey's competitiveness and be the source of future jobs for the state's workers. New Jersey is well-positioned geographically, economically, and financially and has growing momentum to continue to benefit from entrepreneurship and innovation. However, the infrastructure, resources, and networks that can support entrepreneurship and entrepreneurs, especially in the green economy, need further development, particularly in underserved communities and among SMWVBEs.

Transitioning to a green economy to bring significant future job growth to New Jersey will require a strong and well-funded state innovation economy, increased investment in the capacities critical to entrepreneurial ventures, and strong supply chains for new goods, services, and processes connected to the green economy. While each feature is individually important, also important are the underlying tailored and intentional policy decisions, program designs, and investments. Therefore, for innovation to thrive in New Jersey, it will require sustained focus from the State and other actors, including the private sector and philanthropy.

## What Stakeholders Had to Say:

- **Government policies and regulations are a welcome tool to support innovation.** Stakeholders talked about the importance of more resources and support for high-tech innovation and aligning New Jersey R&D investments and the goals of the private sector, the value in reducing hurdles to creating new businesses, and the overall importance of reducing regulatory burdens and the cost of doing business for green energy start-ups.
- **Other stakeholders discussed the need to drive more innovation in underserved communities.** Programs could be made more available to a wider array of potential beneficiaries to cultivate entrepreneurial ideas and develop skills. Several stakeholders discussed the incubation of small business enterprises in underserved communities as a valuable future opportunity of the green economy, and the need to build infrastructure, capacity, and networks to support them.

**CURRENT APPROACH**
Key factors can seed and support successful innovation ecosystems and provide the foundation upon which New Jersey's future green economy and technologies can develop. Many of these factors are already present in New Jersey, but each must be further fostered and applied to the green economy. This section focuses on the importance of 1) People, 2) Market Demand, 3) Access to Capital, 4) Spaces, and 5) Perception.

**Innovation begins with talented people** who develop ideas and the education system that supports turning these ideas into reality. Entrepreneurs, scientists, engineers, students, and educators all contribute to an innovation economy through their knowledge and insight. New Jersey's diversity is a significant source of creativity and drive. New Jersey also has a strong network of affordable and high-quality state and community institutions of higher learning, and a highly educated workforce in part from the 19 Fortune 500 companies headquartered here. However, many of New Jersey's current strengths are in fields such as pharmaceuticals, healthcare, agriculture, and tourism; additional focus is required on fostering a workforce dedicated to the green energy sector within the state. This includes early exposure to green energy and developing a new vocabulary to characterize career pathways (further discussed in Opportunity 9).

**Market demand** provides the natural incentive to develop new technologies, services, and businesses, and signals that new solutions are required and will be supported. Green sector market demand can come in response to environmental events such as impacts from climate change like severe weather events, societal drivers like consumer trends and changing corporate procurement practices, or policy decisions like legislation and regulations setting renewable energy standards. As

shown in Opportunity 1, New Jersey has passed and is implementing clean energy policies that will support over 7,500 MW of offshore wind, 17,000 MW of solar energy by 2035, two million alternative vehicles by 2035, 2,000 MW of energy storage by 2030, hundreds of megawatts of community solar, and continuing energy efficiency expenditures measured in the billions of dollars. These policies are being implemented, creating real-time demand for services and technologies to support these policies. To maintain the confidence of investors and entrepreneurs, New Jersey must continue to incentivize and facilitate the development of the offshore wind industry and solve for emerging issues such as interconnection to the regional energy grid.

**Access to innovation capital** can come from catalytic government financing programs, venture capitalists, specialized early-stage lenders, accelerators, and other companies. A primary role for the state is to convene, connect and develop partnerships to assure that risk-tolerant resources are available and encourage others to participate. The New Jersey Economic Development Authority (NJEDA) already offers a budding core of innovation support programs.[53] These include over thirty active programs, with fifteen programs advertised as "innovation economy programs."[54] One such program is the Clean Tech R&D Voucher Program that was created to subsidize access to core facilities, research and development equipment and makerspaces for small and early-stage clean tech/energy companies in New Jersey. As part of this program, eligible businesses may receive up to $25,000 clean tech development investments per 12-month period.

While these programs provide important support, their focus is not on supporting innovation of green technology and services. Further, many are new, and the state does not have a wide enough base of clean energy investors to take full advantage of these programs. Reviewing program offerings to ensure their accessibility to support green technology and services and availability to the right mix of stakeholders could incentivize greater participation in the green innovation economy.

**Spaces** to meet, think, explore, collaborate, and grow ideas, technologies, and companies is vital. Spaces can include physical areas such as incubators, accelerators, laboratories, and businesses, as well as places for social interactions such as seminars, competitions, meetings, and other events. This helps to ensure that innovation continues and expands through continuous dialogue with a feeder of new stakeholders that exchange ideas over time. In addition to clustering entrepreneurs, workers, and investors, incubators can also provide business training and other resources that new businesses rely on to grow.

New Jersey's space needs are being addressed through many programs such as NJEDA's NJ Ignite program that promotes accelerator program opportunities, Bell Works in Holmdel, and recently announced developments such as the HAX facility in Newark, and 'The Hub' of downtown New Brunswick. In alignment with its policy of developing Strategic Innovation Centers, HAX is set to partner with EDA[55] to establish its US headquarters in Newark. HAX has a proven track record and a multi-faceted approach to helping early-stage tech start-ups grow and succeed, and so this facility is expected to seed significant innovation and entrepreneurial activity in green technologies in New Jersey. On the other hand, 'The Hub', a recently announced $665 million dollar investment effort, will serve as another innovation facilitating space located in downtown New Brunswick and will bring together state researchers to foster an environment conducive to innovation, commercialization translational research, and medical education.[56]

Another example is the New Jersey Ignite program run by the EDA. NJ Ignite supports entrepreneurs by providing rent support grants. In addition, this program offers collaborative workspaces with a new

*"There are large segments of the renewable energy economy that have yet to be unlocked and if you figure out how to unlock them you could get a lot more done."* — UTILITY EXECUTIVE

tenant attraction tool. Bonus months of rent assistance will be added if the company is a registered minority- or women-owned business enterprise.

NJEDA's NJ Accelerate program facilitates innovation through participation in "boot camp" like programs. Start-up founders gain access to mentors, former entrepreneurs, venture capitalists, angel investors, and corporate executives in highlighted sectors, including clean energy. Businesses gain access to the NJ innovation ecosystem, sponsorship, and capital support through NJ Accelerate.

New Jersey can build on these efforts and continue to increase the number of green technology and service-focused design, experimentation, and incubator spaces, alongside valuable technical capacity, available to entrepreneurs, particularly in underserved communities.

**Effective communication can highlight New Jersey as a hub for green energy innovation.** New Jersey can continue to develop its national profile so that individuals and venture capitalists are informed and enthusiastic about growth opportunities in New Jersey. This includes marketing to communicate the incentives available for new businesses and touting successes that have already occurred.

**Advancing this effort in an equitable way that assures the delivery of opportunities for all** is crucial for the state**.** Meaningful efforts to address equity and inclusion in innovation will require significant and long-term commitments and investments that are targeted to solving challenges connected to being an entrepreneur or innovator in underserved environments and require direct engagement of the communities being served. One critical strategy is to increase the availability of capital specifically available to minority-and-women-led businesses to increase equity and diversity in start-up creation, investments, research and development, and manufacturing. A second is to align technical support and capacity with capital access designed to address the unique barriers these individuals and entities face.

To begin addressing this issue, New Jersey's Business First Stop Initiative was developed through a partnership between the New Jersey's Business Action Center (NJBAC) and the EDA as part of Governor Murphy's Stronger and Fairer Economic Plan. The Business First Stop Initiative is an open-source platform where SMWVBEs can access business starter kits, specified program information, targeted financing options, hands-on guidance, resources, and services that are crucial to the launch and continued growth of innovation within this business segment.

### STRATEGIC RECOMMENDATION

**Prioritize and increase investment in the New Jersey innovation ecosystem to spur entrepreneurship and innovation in the green economy, alongside technical assistance, capacity building, and focused support on Small Businesses, Minority and Women-Owned Businesses and Veteran-Owned Businesses.**

### TACTICAL RECOMMENDATIONS

1. **Incubate and support entrepreneurs by establishing spaces that support innovation**, including approaches like entrepreneur-in-residence, incubators, or accelerator programs that provide access to policy and program guidance, mentorship, technical assistance, training, wraparound services, shared office spaces, and business networks. Establish supporting partnerships between founders of green and other businesses and community organizations. Develop a campaign to engage highly visible New Jersey entrepreneurs and businesses to communicate their New Jersey-based success and demonstrate New Jersey's increasingly favorable business environment.

2. **Promote equitable access to investment and resources** in New Jersey's green energy innovations, with a focus on meeting the needs of SMWVBEs small businesses, and startups. Focus investment and resources specifically in underserved communities and measure progress toward increasing equity in access to funding streams and supports. Offer supports that lower barriers to entrepreneurs from underserved communities, including funding to cover the living expenses of entrepreneurs during start-up. Ensure these investments are accompanied by technical assistance and other resources to support success.

3. **Identify and convene key stakeholders** – green technology business, labor unions, utilities, and other entities – to seed innovation in the green sector. Convene these stakeholders to align around shared incentives like job creation and workforce training and support, to ensure that innovation in the green sector is viewed as a win-win.

4. **Lead by example by harnessing the purchasing power** of the State and statewide institutions by constructing RFP's and RFI opportunities specifically to seed innovation and support the inclusions of diverse stakeholders in the green economy.

### OPPORTUNITY 8:

**Anchor manufacturing and supply chains in New Jersey to maximize gains in the green economy.**

Expanding New Jersey's manufacturing sector and supply chain in green industries can boost jobs, increase local economic development, and support innovation. Manufacturing jobs are typically high-wage good jobs, accessible to a wide range of educational backgrounds. They also have the highest multiplier effect of any sector, meaning that a dollar spent on manufacturing brings significant overall benefit to the New Jersey economy.[57] Manufacturing firms can facilitate the development of industry clusters, which are collections of companies, institutions, and other relevant entities focused on a specific industry.[58] New Jersey is well experienced with industry clusters, such as its world-leading life sciences cluster.[59] Offshore wind represents one important opportunity to develop a new, advanced cluster for this technology as discussed below. With a clear policy strategy that combines certainty and investment with an intentional emphasis on equity, New Jersey can further leverage its strong manufacturing sector and supply chains to support New Jersey's goals in transitioning to a green economy.[60]

As seen in Chapter 3, in the next 10 years, as a result of green job growth, employment in the construction industry will represent the largest portion of green jobs created in New Jersey *(See Table 4 – Employment Projections by Industry)*. The construction industry will account for a net 76,645 job-years over 10 years, while the professional and business service industries will account for a net 58,162 job-years; these industries include engineering, legal, architectural, consulting, and other professional services that support the green economy. Additionally, green job growth will result in 73,238 net new job-years in the manufacturing industry.

## What Stakeholders Had to Say:

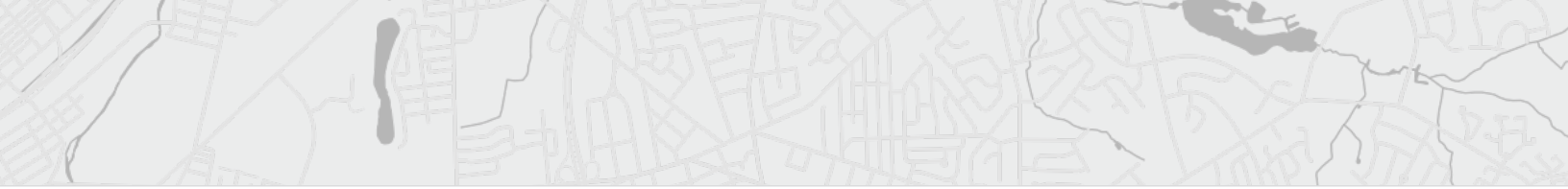
- **Stakeholders were confident New Jersey could build the manufacturing and supply chain capacity for green technologies**, but felt the State needed to closely examine its advantages and understand the opportunities more clearly to develop a comprehensive strategy. Some felt that the supply chain was already potentially in place but that companies would need support retooling and reskilling their workers. Others highlighted the importance of both big manufacturers (and how best to bring them to the state) and investment in developing small manufacturers.

**CURRENT APPROACH**

As seen in Chapter 3, in the next 10 years, green job growth will result in 73,238 net new job-years in the manufacturing industry. The construction industry will account for a net 76,645 job-years over 10 years, while the professional and business service industries will account for a net 58,162 job-years. Solar and energy efficiency deployment and investment is centered on technologies where New Jersey does not have strong manufacturing roots. However, new technologies such as offshore wind, storage, and alternative vehicles provide significant opportunities for growth in New Jersey's green economy and additional manufacturing and supply chain jobs.

Building a manufacturing base for any technology requires integration of several broader, foundational elements[61] such as 1) available transportation and other infrastructure, 2) access to markets, 3) workforce training and education, and 4) predictable/favorable policy and regulatory environments. New Jersey is already well positioned in a number of these areas.

New Jersey sits in a prime location at the center of the Northeast Corridor and has the natural advantage provided by its ports at Newark/Elizabeth, Camden, Paulsboro, and the New Jersey Wind port. The Port of New Jersey/New York is the third-largest port in the nation in terms of value of goods moving through the Port.[62] In addition to its ports, New Jersey's highways and location make it a supply chain powerhouse and a leader in trade and logistics. Other sections of this report address New Jersey's strong policy environment



that is driving markets for clean energy and supportive workforce development programs.

There are additional opportunities to build on those strengths and drive towards building a local supply chain and manufacturing base for green products and technologies that drives quality job growth, ensuring equitable opportunity for workers and companies, and lays a foundation for significant investment capital in New Jersey's green manufacturing sector. They include 1) a need for supply chain analysis, 2) local content requirements, 3) technical assistance, and 4) access to capital. Active recruitment, training, and cultivation of a manufacturing-specific workforce can be a critical piece of any manufacturing sector expansion.

**Supply chain analysis** is an important first step to strategically developing a localized New Jersey supply chain and manufacturing base for specific green technologies. This begins with understanding what specific industries and component manufacturing New Jersey is well positioned to develop alongside understanding the dynamics of the labor market as well as the needs of employers in New Jersey's manufacturing sector. For example, recent analysis from Council members located 1,300 companies in New Jersey that could make components for offshore wind.[63] Coupling that with an examination of local labor market realities, including supply and demand, skills gaps, certification requirements, and the overall training landscape and capacities, is critical to supporting and strengthening the future green workforce.

*"The majority of manufacturing needed for the green economy will require small businesses that manufacture the tools and equipment that goes into the manufacturing process."*

— MANUFACTURING EXECUTIVE

**Local content requirements** ensure that projects, typically those with public funds attached, source green technologies or materials from in-state manufacturers and suppliers and therefore support job creation in the local manufacturing industry and supply chain. These local content requirements have become increasingly popular, particularly for offshore wind projects. Ørsted won the bid for New Jersey's first offshore wind project, Ocean Wind, in part because its plans included strong guarantees to source content from local manufacturers. Other offshore wind developments in Massachusetts, Rhode Island, and Connecticut also include domestic content requirements.

The concept of local content requirements can be complemented by financial incentives. Instead of a content requirement, local green policy may include a domestic content credit. Domestic content credits increase tax credits by a set percentage for renewable energy developers that use domestically sourced products.[64] In the past, the New Jersey Renewable Energy Manufacturing Incentive Program provided rebates to residents, businesses, local governments, and non-profit organizations that purchased and installed solar technology manufactured in New Jersey.

**Technical assistance** for a manufacturer can range in complexity from helping to improve operations and reduce costs, to recruiting and training new workers, up to retooling their equipment, process, and workforce to join a new industry. New Jersey's manufacturing extension program provides consultation and partnership to local manufacturers and businesses. Increasing resources to support technical assistance as part of a focused green manufacturing strategy can enable greater access to this support and information for the New Jersey green supply chain development.[65]

**Access to capital** is consistently a barrier for manufacturers, especially those moving into new technologies. Manufacturers need capital to retool or upgrade their facilities, upskill their workforce, establish new supply chain relationships, and otherwise meet the needs of manufacturing green components.[66] This especially impacts small and medium manufacturers and emerging start-ups who wish to pursue new markets.[67] New Jersey has previously provided grants and loans to support

clean energy manufacturing under the Clean Energy Manufacturing Fund, established in 2009. Recently, Governor Murphy announced a $250 million investment into a new monopile manufacturing facility located at the Port of Paulsboro Marine Terminal in Gloucester County. The new facility is projected to create as many as 260 jobs during the first phase of construction and manufacturing and marks the largest industrial offshore wind manufacturing facility in the United States to date.

**Training and educational pathways are important to developing a robust manufacturing workforce pipeline**. Mixing foundational training with a flexible skill-focused approach allows for a wide range of interests in future manufacturing workers and future career pursuits. Success in building these pathways also requires industry support and connections between many stakeholders, especially across the educational ecosystem. Recruiting through a range of partners, especially among hard-to-reach populations, is important to ensure a regular flow of potential workers that represents the diversity of New Jersey. Funding from a variety of sources ensures greater breadth of coverage of populations and higher impact.

New Jersey Manufacturing Extension Program (NJMEP) is recognized by the New Jersey Department of Labor and the United States Department of Labor as a Registered Apprenticeship Sponsor for occupations such as industrial manufacturing production technician, CNC industrial manufacturing production technician, and logistics technician. Additionally, through their Pro-Action Education Network, NJMEP works closely with community partners, CTE schools, vocational/technical Schools, community colleges, and over 25 career centers, pooling resources and expertise to create as many pathways as possible for students. This program is helping prepare for the future of new green manufacturing jobs.

### STRATEGIC RECOMMENDATION

**Develop programs and policies, backed by research, which prioritize local content to drive growth in manufacturing and supply chain sectors.**

### TACTICAL RECOMMENDATIONS

1. **Analyze specific opportunities for manufacturing and supply chain development in the green economy**, building off the model established through offshore wind, specifically highlighting opportunities for and directories of start-ups, microentrepreneurs, and SMWVBEs in the state's green manufacturing supply chain.
2. **Continue to prioritize manufacturing and supply chain commitments** from large-scale green energy developers and companies.
3. **Enhance existing recruitment tools for green economic development** such as incentives and tax credits for manufacturers of green technologies who relocate or expand in New Jersey.
4. **Boost development of green supply chains** through accelerators grants, technical assistance, network linkage, and other support.
5. **Direct grant program and tax credits to support retooling** among green manufacturers, with enhanced benefits for SMWVBEs.
6. **Support and expand funding for regionally specific, partnership-driven education and training pathways.**

## OPPORTUNITY 9:

**Leverage New Jersey's top-ranked education systems to develop the green workers and entrepreneurs of the future.**

New Jersey has a highly educated workforce, with 44.1% of workers having a four-year college degree compared to the national average of 33%.[68] The state is working toward a goal of 65% of residents obtaining a postsecondary credential by 2025, in order to meet the demand for a skilled workforce. The state is home to seven research universities[69] as well as a well-regarded community college system, awards the second highest percentage of STEM degrees among states in the Northeast,[70] and boasts the highest concentration of scientists and engineers per square mile in the country. New Jersey has one of the best public education systems in the country* and has the 2nd highest high school graduation rate in the country. All these factors create the conditions for a well-educated workforce that can draw jobs, companies, and innovation to the state, while also

* World Population Review, "Public School Ranking by State 2021", 2021, https://worldpopulationreview.com/state-rankings/public-school-rankings-by-state

*"There is very little encouragement for skills trade from government, communities, and parents. We need to start showing the earnings potential for skills trade."* — TEACHER

providing the capacity to train that workforce for new opportunities in the green economy.

## What Stakeholders Had to Say:

- **Stakeholders felt New Jersey's education sector should be maximally leveraged to develop workers of the future at all levels.** Ideas that were shared with a focus on the green economy include offering hands-on training starting in 9th grade, bringing back enterprise courses, creating early career development programs in high school, focusing on green technology STEM courses, and bringing teachers directly into the conversation to have the most impact.
- **Due to competition and the need for an aligned vision, stakeholders recommended developing a specific strategy to engage community colleges and vo-tech schools in the green economy.** This would include increasing early exposure of opportunities for students, developing common curriculums and training programs for all clean energy technologies, and bridging institutes of higher education with community colleges.

**CURRENT APPROACH**

In order to leverage this top-ranked education system to develop the green workers of the future, the entire ecosystem will need to be included in the transition to the green economy: K-8 education, high schools, community colleges, vocational schools, private schools, and higher education.[71] The Education & Workforce Development Taskforce formed by the New Jersey Business and Industry Association (NJBIA), has identified three key methods to reskill, reshape, and rehire New Jersey's workforce: 1) expanding business, academic, and government partnerships, 2) training for current jobs while preparing for the future, and 3) ensuring equitable access to education and workforce development opportunities.[72] In addition, New Jersey should further increase its engagement of the younger population by expanding exposure of green career opportunities to reach K-12 education.

**Expanding business, academic, and government partnerships**

Existing programs working on upskilling and reskilling can be reinforced with more connections between education, workforce development, and industry. Many programs operate with limited interconnectivity among regional stakeholders and potential partners who could help to expand these initiatives throughout the state. The opportunity for collaboration is immense.

New Jersey's Pathways and Skills Collaboratives, a new initiative launched in 2020 by New Jersey's community colleges, promotes the earning of stackable, industry-valued credentials by designing and offering pathways guided by industry-specific employer leadership groups and informed by labor market intelligence. The Collaboratives bring together key employers, industry associations, labor unions, workforce development boards, county vocational-technical high schools, community colleges, four-year colleges and universities, and community-based organizations. Companies participating in the program include HP, Campbell's, Norwalt, Brimar Industries, Ostuka and Teknogrid. HAX, referenced earlier in the Innovation opportunity, has an opportunity to be one of these key employers to develop skilled talent for HAX Hub's rapidly scaling portfolio companies.

**Training for current jobs while preparing for the future**

Identifying which industries in the green economy will employ the most individuals in the future and which industries will pay the best wages is essential to New Jersey's future workforce success. However, while preparing for the future, New

*"Engage college recruiters and educate them on green careers. Get college students out of legacy jobs and into green ones."*

— BUSINESS LEADER

Jersey will continue to adequately train workers for current jobs. The New Jersey Apprenticeship Network (NJAN), sponsored by the NJ Department of Workforce and Labor Development (NJDWLD), connects job seekers and employers with available apprenticeship programs, with program participants 91% more likely to remain employed with a company, reducing recruitment and turnover costs for employers.

**Ensuring equitable access to education and workforce development opportunities**

New Jersey has significant inequities in post-secondary education attainment by race, ethnicity, and geography. While 57% of New Jerseyans have earned a post-secondary degree or credential, only 31% of Black and 24% of Hispanic residents have had the same access to post-secondary education. Over 60% of adults in Morris, Somerset, and Hunterdon counties hold post-secondary credentials, while less than 35 percent of adults in Cumberland, Salem, and Passaic counties hold postsecondary credentials. Addressing these disparities is an economic necessity.[73]

**Engaging the younger population by expanding green career opportunities to reach K-12 education**

Green career education can begin early and then be integrated into curriculum and coursework throughout grades K-12. New Jersey is leading the nation as the first state to incorporate climate change education across its K-12 Board of Education Learning Standards.[74] New Jersey's FY23 budget includes $5 million to stand up an office of climate change within NJDOE, and provide grants to districts to implement climate change education Alongside incorporating this multi-disciplinary approach into the education ecosystem, New Jersey can leverage opportunities to convert real-world expertise into meaningful and immersive educational experiences. Through these types of activities, students can participate in hands-on sustainability and clean energy activities, learn about career opportunities in the clean energy economy, and engage with practitioners through discussions, demonstrations, and facility tours.

Modeled after the successful Sustainable Jersey program for municipalities launched in 2009, the Sustainable Jersey for Schools program was launched in 2014 in partnership with the New Jersey School Boards Association (NJSBA) and a coalition of educational organizations and academic, business, and state agency partners. It is a free, voluntary certification program for K-12 public schools in New Jersey and provides guidance, resources, and recognition to schools that implement sustainable "actions" in their operations and/or curriculum.[75] The Sustainable Jersey for Schools program has grown from 59 certified schools in the first year to 1,050 schools and 64% of New Jersey's public school districts participating today.[76] This program, and others like it, can also be leveraged to bridge opportunities between K-12 schools, vocational programs, unions, businesses, community, and beyond to develop immersive-learning "certifying actions" to engage students on career pathways in the green economy.

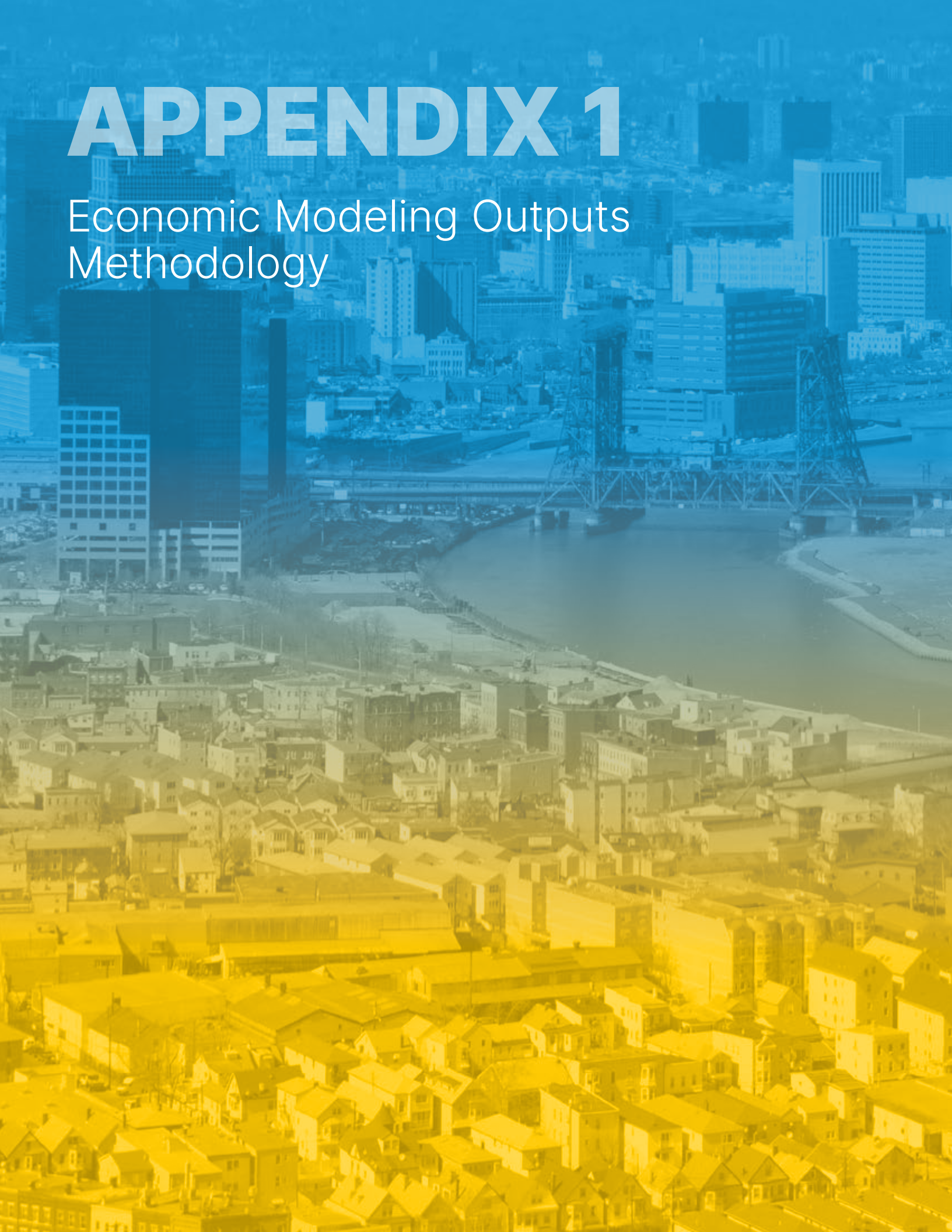
NJSBA has developed another green education initiative, sponsored by the U.S. Army, geared towards real-life application, problem-solving, and collaboration: The STEAM Tank Challenge. This yearly challenge is open to K-12 New Jersey public school students and is a great opportunity for teams of students to think critically to identify and present innovative solutions to real-world issues.[77] Students must consider the environmental and climate change implications in their project.

**STRATEGIC RECOMMENDATION**

**Increase resources to expand green energy related programming, increase green-related education, build curriculum, and look to establish partnerships across institutions.**

## TACTICAL RECOMMENDATIONS

1. **Include green career opportunities in K-12 outreach and education,** while directly connecting middle and high schools to green companies and vocational schools to expose students to green energy and other initiatives. Include community organizations in partnerships to drive internship opportunities for students from underserved communities; engage teachers, guidance counselors, and school boards directly. New Jersey should also consider specifically mandating education on green career opportunity in the next update of the NJ Student Learning Standards.
2. **Develop fellowship/scholarships and loan redemption programs for postsecondary schools** in partnership with the philanthropic sector and education institutions, with a focus on environmental issues, sustainable solutions, and green opportunities in underserved communities.
3. **Encourage alumni to work, create, and innovate in the green sector in New Jersey** through employer incentives and partnerships with the state's higher education institutions, such as tuition reimbursement programs and hiring campaigns/ opportunities.
4. **Co-locate green training facilities** with colleges, universities, trade schools, and community colleges and further engaging and educating recruiters and educators on potential green careers.
5. **Partner with the state's universities and New Jersey Council of Community Colleges**. Leverage career pathway initiatives across New Jersey to address gaps in workforce education and skills by developing green sector training programs at the tertiary level.
6. **Evaluate the Education Opportunity Fund and NJ STEM Scholars** and determine how the green economy can become a focal point of these programs.



# APPENDIX 1

## Economic Modeling Outputs Methodology

# Appendix 1
# Economic Modeling Outputs Methodology

**Introduction**

This section details the methodology, assumptions, and model outputs of clean energy policies in New Jersey and the impact on the job market. The modeling effort spans six major sectors: Solar Generation, Offshore Wind Generation, Energy Efficiency, Alternative Vehicles, Grid Infrastructure & Storage, and Green Infrastructure. This memo will detail the number of jobs supported from investments made possible by policies enacted by the state of New Jersey across the six sectors. Alternatively, this memo will also detail the negative job impacts caused by funding policies through utility customer rate payments or taxes. Higher taxes or higher utility rates can reduce expendable income to residents and earnings for businesses, which results in negative employment impacts. Job declines will also arise from disinvestments in fossil fuel technologies and lost revenue for utilities. Outputs presented in this memo detail activities over a ten-year period, from 2022-2031.

Definitions of data outputs are found below:

1. Employment:
   a. Direct – Direct effects show the change in the economy associated with the initial investment, or how the industry experiences the change.
   b. Indirect – Indirect effects include all the backward linkages, or the supply chain responses as a result of the initial investment.
   c. Induced – Induced effects refer to household spending and are the result of workers who are responsible for the effects of spending their wages.
2. Value Added – Value added is the total output minus the cost of inputs from outside the firm; it is a measure of the contribution to the Gross State Product made by the companies or industries.
3. Labor Income – Labor income includes all forms of employment income, such as employee compensation (wages and benefits) and proprietor income (i.e., payments received by self-employed individuals and unincorporated business owners).
4. Taxes – Taxes include local, state, and federal taxes on production and imports less subsidies, income tax, corporate income and profits taxes, and payroll taxes.

Important note: all employment data will be described in job-years. Job-years are useful in calculating the amount of work required to complete a project. A job-year represents one year of work for one person. In other words, a new construction job that lasts five years would be considered five job-years. Job-years are especially useful in representing employment in the trades, given that workers frequently move from project to project. As an example, 86,700 job-years for the solar sector over 10 years translates to 8,670 solar jobs supported for the next 10 years.

**Methodology and Assumptions**

*Offshore Wind:*
The assumptions used for the economic impact and employment calculations for the offshore wind sector were predicated on publicly available data from currently awarded projects, with data extrapolated for future awards where necessary. Based on the 10-year examination period from 2022-2031, it was assumed that a total 4,958 MWs would be installed by the State of New Jersey by 2031. It was also assumed that a total of 19,229 MWs would be installed by neighboring states, Connecticut, Massachusetts, Maryland, North Carolina, New York, Rhode Island, and Virginia, by 2031, and would rely on New Jersey for supply chain support. The production of each resource was based upon the Offshore Wind Renewable Energy Certificate ("OREC") allowance set forth in the Board Order authorizing the project to receive ORECs.

Two benefits are examined in the analysis with respect to potential job creation associated with offshore wind investment. The first and primary benefit is the value of in-state expenditures, including project development, construction, and operations of offshore wind projects developed by New Jersey. The second benefit is the value of in-state expenditures on supply chain activities, including manufacturing and marshalling, as well as supporting offshore wind projects developed by neighboring states. Total development, construction, operations, and supply chain costs are based upon the National Renewable Energy Laboratory's (NREL) Jobs and Economic Development Impact (JEDI) offshore wind model and adjusted to account for expected in-state expenditures.

The analysis also includes two negative impacts that could reduce economic activity and jobs. The first and primary negative impact is the cost recovery associated with OREC obligations to the State's electric customers. The OREC costs will be collected through customer electricity bills, which reduce household and business spending in other areas of the economy. The second negative impact is the lost revenue to existing in-state generators, primarily fossil-fueled resources. OREC costs are determined based upon Net OREC costs for approved projects when available and extrapolated for future projects. Revenue losses to generators is determined based upon an energy price forecast and the expected reduction of in-state generation.

The summation of these benefits and costs provides the net economic and job creation impacts of offshore wind investments. The analysis only considers costs and benefits within the 10-year study period.

*Solar:*
The economic impact and employment calculations for the solar industry are based upon targets and expected development in the Successor Solar Incentive (SuSI) program. The analysis assumes 8,750 MW of solar would be installed during the 10-year investigation period.

Four benefits are incorporated into the analysis of potential job creation from solar investments. The first benefit is the value of in-state expenditures to install the solar arrays. The second benefit is the expenditures associated with ongoing operations and maintenance of the solar arrays. The third benefit is the energy savings to behind-the-meter customers on their electric bills from reducing electricity consumption. The final benefit is merit order price suppression from the demand reductions and new generation from grid supply projects. Solar expenditures are based upon cost estimates from the National Renewable Energy Laboratory (NREL). Only certain components and activities are assumed to occur in-state, while others, such as the modules and inverters, are expected to be imported. The expenditures on operations and maintenance are based upon cost assumptions from NREL. Customer savings are calculated based upon an assumed 15% savings against existing and expected retail electricity rates for residential and commercial customers. Energy merit order is calculated based upon a regression of historical wholesale electricity prices, gas prices, load, and seasons.

The analysis also includes two negative impacts that could reduce economic activity and jobs. The first and primary negative impact is the cost recovery associated with SuSI incentives from the state's electric customers. The second negative impact is the lost revenue to existing in-state generators, primarily fossil-fueled resources. SuSi incentives are

based upon the current range of incentives and deescalated over time to account for potential cost efficiencies. Revenue losses to generators is determined based upon an energy price forecast and the expected reduction of in-state generation.

The summation of these benefits and costs provides the net economic and job creation impacts of solar investments. The analysis only considers costs and benefits within the 10-year study period.

*Energy Efficiency:*
The economic impact and employment calculations for the energy efficiency sector are largely based upon approved energy efficiency programs by the state's electric and natural gas utilities, activities by the BPU's Clean Energy Program, and goals set forth in Board Orders. The analysis assumes incremental electric energy efficiency savings would scale up to 2.15% of state load by 2025 and incremental natural gas energy efficiency savings would scale up to 1.10% of state load by 2025, with both holding that savings percentage constant thereafter.

Three benefits are examined with respect to potential job creation associated with energy efficiency investments. The first benefit is the value of in-state expenditures to install the energy-efficient measures. The second benefit is the energy savings to customers on their electric and natural gas bills as a result of reduced consumption and demand. The final benefit is merit order price suppression. In the case of energy efficiency, the merit order benefit occurs as a result of reductions in demand rather than supply. Energy efficiency expenditures are forecasted based upon the most currently approved energy efficiency program costs and savings by the Board. Customer savings were calculated based upon existing and expected supply rates for customers. Energy merit order was calculated based upon a regression of historical wholesale electricity prices, gas prices, load, and seasons.

The analysis also includes two negative impacts that could reduce economic activity and jobs. The first and primary negative impact is the cost recovery associated with energy efficiency programs to the state's electric and natural gas customers. The second negative impact is the lost revenue to existing in-state generators, primarily fossil-fueled resources. Total energy efficiency investments are based upon approved energy efficiency programs by the state's electric and natural gas utilities, activities by the BPU's Clean Energy Program, and goals set forth in Board Orders, converted to an annual revenue requirement using an average weighted average cost of capital and seven-year amortization period. Revenue losses to generators are determined based upon an energy price forecast and the expected reduction of in-state generation.

The summation of these benefits and costs provides the net economic and job creation impacts of energy efficiency investments. The analysis only considers costs and benefits within the 10-year study period.

*Electric Vehicles:*
The economic impact and employment calculations for the electric vehicle industry is based upon research on vehicle purchase trends and the charging infrastructure required to attain the State's goals of 300k electric vehicles by 2025 and 2 million by 2035. For the 10-year review period, the analysis assumes over 1.6 million new electric vehicles and chargers by 2031.

Five benefits are examined with respect to potential job creation associated with electric vehicle investment. The first and primary benefit is the value of in-state expenditures, primarily related to the construction of vehicle chargers and the system that supports them. The second benefit is the value to dealers associated with sales of electric vehicles that typically have a premium in price over an equivalent gasoline vehicle. The third benefit is fuel savings to owners due to the switch from gasoline to electricity. The fourth benefit is avoided maintenance to owners. The final benefit is increased revenue to generators due to increased in-state electric consumption from electric fueling. Infrastructure costs are based upon current and future expected required expenditures. The cost premium between gasoline and electric cars is forecasted to determine the premium for electric vehicles, of which only a portion is assumed to be retained by dealers as additional profit. Federal or state incentives do not decrease this premium as the full cost is still paid to the dealer for the vehicle. Fuel savings are calculated based upon expected gasoline and electricity prices and fuel efficiency of vehicles.

Avoided maintenance is based upon the expected labor component of maintenance, as parts and materials are assumed to be imported. Increased revenue to generators is determined based upon an energy price forecast and the expected increase of in-state generation.

The analysis also includes five negative impacts that could reduce economic activity and jobs. The first impact is lost revenues from reduced gasoline purchases. The second negative impact is the premium paid by owners for electric vehicles. The third is losses to mechanics due to reduced maintenance of electric vehicles. The fourth negative impact is program costs related to state and utility programs supporting the electric vehicle infrastructure build-out. The final negative impact is the additional electricity costs associated with charging electric vehicles. The lost revenue due to reduced gasoline purchases is calculated based upon current and future expected gasoline prices. The vehicle premium paid by owners is assumed to be net of any federal incentives, which decreased the overall premium (and decreased the negative impact). Losses to mechanics for reduced maintenance is based upon current and expected maintenance costs of gasoline vehicles versus electric vehicles. Program costs are based upon cost estimates of existing programs that support electric vehicles, which include those from the BPU, EDA, utilities, and others. Additional electricity purchases recalculated based upon forecasted retail electricity rates and assumed efficiency of electric vehicles.

The summation of these benefits and costs provides the net economic and job creation impacts of electric vehicles. The analysis only considers costs and benefits within the 10-year study period.

*Grid Infrastructure & Storage:*
The assumptions used for the economic impact and employment calculations for the grid infrastructure and storage sector were predicated on publicly available data from five (5) currently funded grid infrastructure and storage initiatives: BPU Energy Storage Incentives, PSE&G Energy Strong II, NJNG IIP, PSE&G CEF-EC AMI, and ACE AMI.

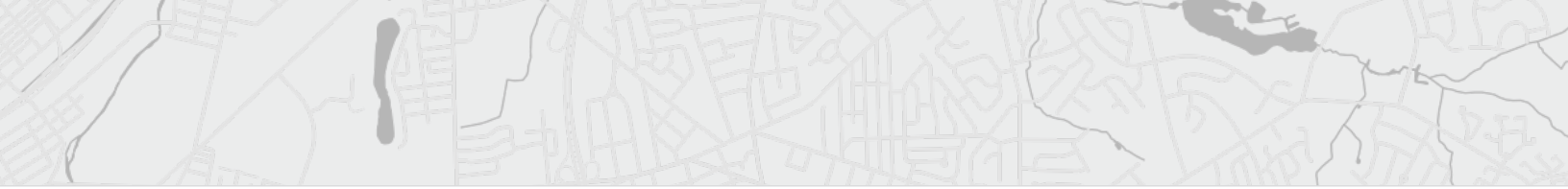
The value of in-state expenditures, including project development, engineering, construction, and operations, is examined in the analysis with respect to potential job creation associated with grid infrastructure and storage investment. Investments are allocated within the model based on the focus of each funding source – grid or storage – as well as the mix of industries associated with each activity, identified by the research team.

The analysis also includes negative impacts that could reduce economic activity and jobs from the cost recovery associated with the funding of these policies. The costs will be collected through a series of rate adjustments to the state's customer electricity bills, which reduce household and business spending in other areas of the economy.

The summation of these benefits and costs provides the net economic and job creation impacts of grid infrastructure and storage investments. The analysis only considers costs and benefits within the 10-year study period.

*Green Infrastructure:*
The assumptions used for the economic impact and employment calculations for the green infrastructure sector were predicated on nine (9) currently available loan, bond, and grant programs in the state. Five (5) of the funds included in the green infrastructure investment basket focused on clean and drinking water infrastructure are outlined in the New Jersey Assembly Bill 5053, while the remaining four are sourced from N.J.S.A. 58:12A-26 (Private Well Testing Act), N.J.S.A. 48:3-60.3 (Acoustical Testing Pilot Program), the NJ DEP initiative to reduce and prevent future harmful algal blooms, and Governor Murphy's statewide lead strategy.

The value of in-state expenditures, including project development, engineering, construction, and operations, is examined in the analysis with respect to potential job creation associated with green infrastructure investment. Investments are allocated within the model based on the focus of each funding source – clean or drinking water, well testing, acoustical testing, lead remediation, or algal bloom prevention – as well as the mix of industries associated with each activity, identified by the research team.



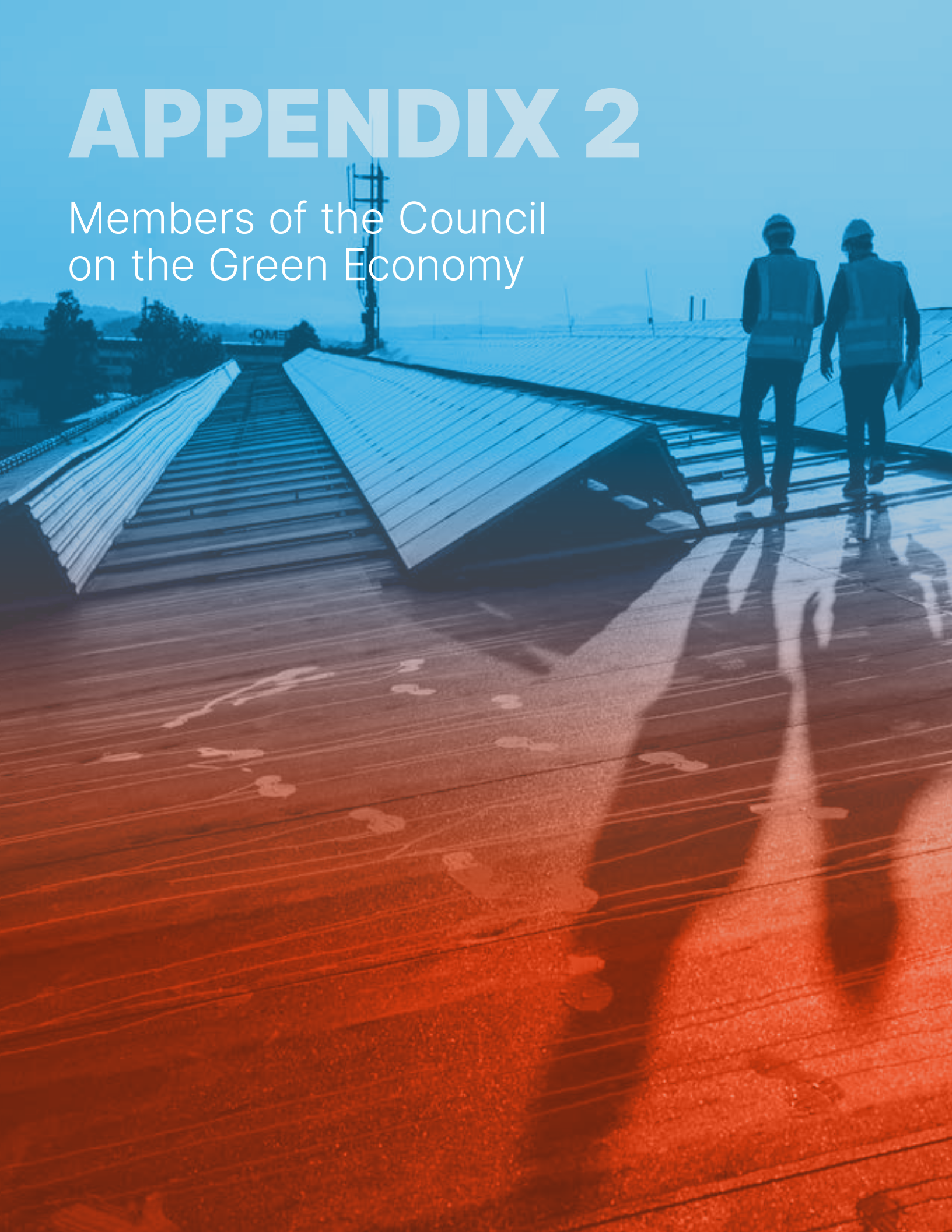
The analysis also includes negative impacts that could reduce economic activity and jobs from the cost recovery associated with debt repayment on interest-free, 30-year loans. The costs will be collected through debt payments by state municipalities, which are paid through resident taxes, which reduce household and business spending in other areas of the economy.

The summation of these benefits and costs provides the net economic and job creation impacts of green infrastructure investments. The analysis only considers costs and benefits within the 10-year study period.

**Industry and Occupational Outputs**
Industry employment outputs are calculated natively by IMPLAN. Modeled expenditures are input into the specific industries identified in each sector model, while impacts to customers are input into an economy-wide industry mix. Occupational outputs are generated using staffing pattern analyses developed by BW Research. These staffing patterns analyze the occupational constitution of industry groups within each major sector, then weight occupational employment by industry employment within the sector.

# APPENDIX 2

## Members of the Council on the Green Economy



# Appendix 2
# Members of the Council on the Green Economy

**Honorary Chair: First Lady Tammy Snyder Murphy**
Born in 1965, Tammy Snyder Murphy is a native of Virginia and a graduate of the University of Virginia (B.A., English and Communications, 1987). She and her family reside in Monmouth County, New Jersey. Tammy and New Jersey Governor Philip D. Murphy have been married for 28 years and together have four children: Josh, Emma, Charlie, and Sam. A transformative experience for the Murphy family was proudly representing the United States in the Federal Republic of Germany from 2009 to 2013. Tammy, individually and together with her husband, spoke and led on behalf of the United States of America. She chaired meetings, gave speeches, and hosted meals and receptions, strengthening our nation's relationship with a critical ally while impacting the lives of thousands of Germans and Americans. Upon returning to New Jersey, Tammy and Phil realized that the incredible state they call home needed bold new leadership. Together, they founded a think tank to explore ways to help grow the middle class and jumpstart New Jersey's economy. During the campaign, transition, and now as First Lady, Tammy has been energized and inspired traveling the state and meeting New Jerseyans to hear their concerns, utilizing her experience in the private and nonprofit sectors to work through policy ideas and solutions. Over the years, Tammy has worked with non-profits, a think-tank, and other organizations focused on the environment, education, health care, youth and family services, as well as the arts and trans-Atlantic relations. She currently serves as Secretary and charter member of The Climate Reality Action Fund, an organization founded by former Vice-President Al Gore. Tammy previously worked in finance in the United States and Europe and has traveled extensively throughout the world living overseas in each of London, Frankfurt, Hong Kong, and Berlin. She speaks German and some Italian. As First Lady, Tammy's policy initiatives focus on infant and maternal health, climate change education, and fostering women-owned businesses throughout New Jersey. She has worked to create Family Festivals across the state to increase access to resources for mothers, children, and families; worked with the New Jersey Department of Education to incorporate climate change throughout the K-12 state education guidelines to better prepare our students for the future economy; and partnered with the New Jersey Economic Development Authority to increase angel investing in women-led businesses. She continues to be a partner to Phil as he works with Lieutenant Governor Sheila Oliver to tackle the formidable challenges facing New Jersey and its incredible residents.

**Executive Director: Jane Cohen, Executive Director, Office of Climate Action, and the Green Economy**
Jane Cohen is Senior Advisor to New Jersey Governor Phil Murphy, where she handles the environment and energy portfolio, leading work on the Governor's clean energy agenda, environmental justice, and climate resiliency work, and among other key initiatives. Prior to joining the Governor's office, she was the Policy Director at Isles, Inc, where she led strategy for a broad portfolio of policy issues including lead poisoning prevention and healthy housing, urban air pollution and electric vehicles and workforce development in the green jobs sector. Prior to her work in New Jersey, Jane was a Senior Researcher for Human Rights Watch, where she helped launch the organization's environmental policy and human rights program and authored their first report on climate change. A specialist on China, she also led extensive field research on health, environmental and political issues in Nigeria, Zimbabwe, Kenya and Japan. Jane conducted international advocacy with governments, international organizations and the United Nations and has published extensively on global environmental issues. Jane holds dual master's degrees from Columbia University: A Master of

**Co-Chair: Robert Asaro-Angelo, Commissioner, New Jersey Department of Labor and Workforce Development**
Robert Asaro-Angelo was nominated by Governor Phil Murphy to serve as the Commissioner of the NJ Department of Labor and Workforce Development in January 2018. As Commissioner, Asaro-Angelo oversees the state's diverse services to New Jersey workers. Due in part to the innovation he has spearheaded in New Jersey, in February 2021, Asaro-Angelo was chosen by his counterparts across the nation as the Board Chair of the National Association of State Workforce Agencies (NASWA) for the 2021 association year. From 2010 – 2017, Asaro-Angelo served as Eastern Regional Representative for the U.S. Department of Labor under the Obama Administration, managing the department's regional activities, and coordinating federal initiatives on the regional, state, and local levels. Prior to his government service, Commissioner Asaro-Angelo worked for the Laborers International Union, the American Federation of State, County and Municipal Employees and the Service Employees International Union Local 1115 organizing and educating public employees, construction workers and nursing home employees about government and politics. Asaro-Angelo earned a Bachelor of Science degree in Communications from Boston University and a master's in Public Policy from the Eagleton Institute of Politics at Rutgers University. The Commissioner currently lives in Middlesex County with his family.

**Co-Chair: Joseph Fiordaliso, President, New Jersey Board of Public Utilities**
Born and raised in Newark's Ironbound section, President Fiordaliso has served as an NJBPU Commissioner since 2006, when he was nominated by Governor Richard Codey and confirmed by the Senate. In 2011 and 2013, President Fiordaliso was re-nominated by Governor Chris Christie and confirmed by the Senate to continue serving as an NJBPU Commissioner. In January 2018, Governor Phil Murphy appointed President Fiordaliso to serve as NJBPU President, and he was re-nominated and re-confirmed to the role in May 2019. He currently serves as Co-Chair on the NJ Council on the Green Economy, and also serves on the National Association of Regulatory Utility Commissioners' (NARUC) Committee on Critical Infrastructure and Committee on Energy Resources and the Environment, is a member of the Executive Committee for the Regional Greenhouse Gas Initiative (RGGI), is a member and Secretary-Treasurer of the Mid-Atlantic Conference of Regulatory Utilities Commissions (MACRUC), is a member of the National Council on Electricity Policy (NCEP), is on the Board of Directors of the Organization of PJM States (OPSI), and is a member of the Advisory Council to the Board of Directors of the Electric Power Research Institute (EPRI).

**Co-Chair: Shawn LaTourette, Acting Commissioner, New Jersey Department of Environmental Protection**
Shawn LaTourette is New Jersey's Commissioner of Environmental Protection. He is responsible for formulating statewide environmental policy while directing programs that protect public health and ensure the quality of New Jersey's air, land, water, and natural and historic resources. A lawyer and policymaker with more than 20 years of experience in environmental protection, Commissioner LaTourette began his career defending victims of toxic exposure, including organizing and advocating for the needs of vulnerable New Jersey communities whose drinking water was contaminated by petrochemicals. Throughout a career shaping environmental law and policy, he has served in executive roles and as a trusted adviser to governments, community and non-profit organizations, and leaders in industry and infrastructure, while also litigating high-stakes lawsuits involving environmental, energy and public health concerns. Born and raised in New Jersey, Commissioner LaTourette earned his undergraduate and law degrees from Rutgers University. At Rutgers Law School, he received multiple environmental and governance awards and published scholarship on environmental law, natural resource damage and climate issues.

**Co-Chair: Tim Sullivan, Chief Executive Officer, NJEDA**
Tim Sullivan became Chief Executive Officer of the New Jersey Economic Development Authority (NJEDA) in February 2018. Tim most recently served as Deputy Commissioner of the Connecticut Department of Economic and Community Development (DECD), where he oversaw State tourism and branding, brownfield redevelopment, transit-oriented development, and waterfront initiatives. Tim joined the DECD in January 2014 and became Deputy Commissioner the next year.Tim previously served as Chief of Staff to the New York City Deputy Mayor for Economic Development, focusing on transportation and transit-oriented development, brownfield redevelopment, waterfront and maritime/port redevelopment, public and affordable housing policy, small business support, infrastructure finance, and public/private partnerships. Prior to joining city government in 2010, Tim worked at Barclays Capital as Chief of Staff to the Head of Global Investment Banking. He began his career in investment banking at Lehman Brothers in 2003 as a healthcare banker, focusing on mergers and acquisitions and capital markets transactions for leading companies in the managed care, biotechnology, and healthcare services sectors. Tim is a graduate of Georgetown University.

**Donnel Baird, Founder, BlocPower**
Donnel Baird is the Founder and CEO of BlocPower. BlocPower is a Brooklyn-based climate technology company rapidly greening American cities. Since its founding in 2014, the company has completed energy projects in 1,200+ buildings and delivers results ahead of schedule and under budget. BlocPower utilizes its proprietary software for analysis, leasing, project management, and monitoring of urban clean energy projects and its customers are saving 20-40% on their energy bills each year. The company is backed by the world's top investors, including Kapor Capital, one of Uber's first investors, Andressen Horowitz, early investor in Facebook, Twitter, AirBnB and Lyft, the former Chairman of Google, and American Family Insurance Institute for Corporate and Social Impact. Baird has degrees from Duke University in Political Science and Government and African American/Black Studies. Baird also as an MBA from the Columbia Business School.

**Stefanie Brand, Former Director, New Jersey Division of Rate Counsel**
Stefanie A. Brand served as the Director for the Division of Rate Counsel from 2007 until 2021. The Division of Rate Counsel represents the interests of consumers of regulated electric, natural gas, water/sewer, telecommunications, cable TV service, and insurance (residential, small business, commercial and industrial customers). Prior to joining Rate Counsel when it was then part of what is now the defunct Department of the Public Advocate, Stefanie was the Assistant Attorney General in Charge of Litigation for the Division of Law within the Department of Law and Public Safety. In this position she oversaw all civil litigation for the state. Her tenure with the Division of Law included work on a variety of issues such as child welfare, environmental regulation, human services, employment and tort law. Stefanie brings almost 25 years of legal experience to the Division. She has spent 17 years advocating on behalf of the people of New Jersey. After 5 years in private practice, she joined the Division of Law in 1992. She worked as a Deputy Attorney General for 10 years, focusing on solid waste, environmental cases and federal litigation. In 2002, Stefanie was named Deputy Attorney General in Charge of Litigation and in 2003, she was named Assistant Attorney General.

**Tom Churchelow, President, New Jersey Utilities Association**
Thomas R. Churchelow, Esq., has served as President of the NJUA since November 2019. He joined NJUA in 2013 as Director of Government and Public Affairs, providing legal and policy analysis and developing and implementing the association's legislative, regulatory, and public affairs strategy. Prior to that, he served as a Senior Legislative Counsel in the New Jersey Office of Legislative Services (OLS), serving as a nonpartisan aide to the Assembly Telecommunications and Utilities Committee and providing legal and policy analysis and bill drafting on a range of issues, including energy, transportation, telecommunications, and independent state authorities. Prior to working at OLS, Tom was a Raimondo Legislative Fellow at the Eagleton Institute of Politics where he served in the New Jersey Senate. Tom serves on the Steering Committee of Jersey Water Works, the Energy Efficiency Advisory Group, and on the South Jersey Program Board of Covenant House. He is also an active member of New Jersey Common Ground Alliance. A member of the New Jersey State Bar, Churchelow received a Juris Doctor from Rutgers School of Law and a bachelor's degree from Southern Connecticut School State University.

**Francisco Cortes, President, New Jersey State Veterans Chamber of Commerce**
Francisco Cortes is the CEO & Co-Founder of the global communications firm The Setroc Group, Inc. Francisco serves as the President of the NJ State Veterans Chamber of Commerce and on the Corporate Advisory Board of the Statewide Hispanic Chamber of Commerce of NJ. Throughout his 20 plus year career in broadcast media, Francisco Cortes transformed the way news engaged and informed the public. He drove key innovation and programming initiatives that contributed to the historic success of News Corporation. Francisco became the first Hispanic Vice President in the company's news division and was named one of the Top Young Latinos in American Newsrooms by the Huffington Post and named a media influencer by MyLifestyle Magazine. Francisco also takes great pride in giving back and mentorship. He spends most of his free time giving back to veterans, running marathons, and raising money for veterans causes. He also serves on the Community and Economic Development for the City of Paterson, NJ.

**Dave Daly, Former President, PSE&G**
Dave Daly was named president of PSE&G in October 2017. Previously, he also served as president and COO of PSEG Long Island, vice president for Asset Management and Centralized Services, and vice president of Energy Acquisition and Technology. He also held positions across operations and support services, including power plant operations, utility operations services, electric transmission planning and corporate strategy. Daly retired from his position as president of PSE&G at the end of 2021 after 35 years of service. He is currently the president of EV Edison, a developer of high-power electric vehicle charging solutions.

**Kim C. Hanemann, President and Chief Operating Officer, Public Service Electric and Gas Company**
Kim Hanemann was named president and chief operating officer of Public Service Electric and Gas Company (PSE&G), effective June 30, 2021. Headquartered in Newark, New Jersey, PSE&G is one of the largest combined electric and gas companies in the United States and is New Jersey's oldest and largest publicly owned utility, serving approximately 2.6 million customers, nearly three-quarters of the state's population. PSE&G is the largest subsidiary of Public Service Enterprise Group (PSEG). Ms. Hanemann is a member of PSEG's Senior Executive Team. Previously, she had been PSE&G's senior vice president and chief operating officer. In that role, she was responsible for PSE&G's electric, gas and customer operations, as well as the company's asset management and centralized services organization. She also oversaw the on-time, on-scope and on-budget execution of the company's large construction projects. Prior to being named chief operating officer in January 2020, Ms. Hanemann held numerous leadership positions in both electric and gas field operations and in utility support operations. She is a member of the board of directors of Middlesex Water Co. and the board of trustees of Children's Specialized Hospital. A graduate of Lehigh University with a bachelor's degree in mechanical engineering, Ms. Hanemann also holds a Master of Business Administration from the Rutgers Graduate School of Management.

**Kim Gaddy, Environmental Justice Organizer, Clean Water Action**
Kim Gaddy is the National Environmental Justice Director for Clean Water Action. She has been advocating for communities impacted by industrial pollution and the goods movement system in Newark and across the country for 18 years. Kim develops and implements Clean Water Action/Clean Water Fund's grassroots environmental justice campaigns and coalition building efforts nationally and in New Jersey. She is a former Newark School Board Member, New York/New Jersey Regional Representative for the Moving Forward Network, Port Commissioner for the City of Newark, Appointed by Governor Phil Murphy to serve as Vice-Chair of the NJDEP's Environmental Justice Advisory Council, former Chair of both the Newark Environmental Commission and the Essex County Environmental Commission, a founding member of the New Jersey Environmental Justice Alliance and New Jersey President of the International Black Women's Congress. Previously, she worked in Municipal government in Newark for 12 years and served as the first female Chief of Staff, for Councilwoman Mildred Crump. Kim was recognized for her Community Service in the 2018 Newark Women from Suffragettes to the Statehouse, 2017 selected as 100 People of Newark, Women on the Move Award recipient and a 2007 recipient of the Environmental Protection Agency Region 2 Environmental Community award.

**Daniel Gumble, Business Manager, I.B.E.W. Local 164,**
Daniel Gumble is the Business Manager of I.B.E.W. Local 164, a Union that has an extraordinary reputation which is over a century-long history of progressive leadership in the State of New Jersey. Mr. Gumble's Local Union, which represents over 3,000 skilled and highly trained workers, serves the Bergen, Essex, and Hudson Counties of New Jersey, providing indispensable craftsmanship. Throughout Mr. Gumble's leadership, I.B.E.W. Local 164 has led the way in preparing for the future, giving young workers the quality training, they need to meet the challenges presented by tomorrow's technology. The Local Union is particularly proud of its cutting-edge, state-of-the-art training facility in Paramus, New Jersey. Local #164's young men and women are given hands-on training and prepared for a career by experienced veterans of the electrical industry, who guide students in the latest technology. Personally, Dan is a proud third generation electrician who began working his way up the ranks in both his Union and industry. Dan began his career as an apprentice electrician in 1979 and has worked his way up the ranks from an Apprentice, Journeyman, Shop Steward, Foreman, and General Foreman. This work requires the finest in skills, experience, craftsmanship and most importantly, safety. Before serving as Business Manager for IBEW Local 164, he has also held various positions such as Executive Board Member of the Union for nine years, Recording Secretary and Organizer for four years, Business Agent for eight years and is now serving his third Three-year term as Business Manager of 164 as well as a trustee for the Local Unions various funds. At the beginning of this year was appointed to the IBEW International Office's Law Committee. Aside from his dedication to his Union he has also served as the Treasurer of the Hudson County Building Trades for five years and Executive Board Member for the Hudson County Central Labor Council for nine years. Currently he is serving as a Commissioner for Bergen Utilities Authority for four years, sits on the Board of Bergen County Workforce Development for the past two years and was recently just appointed to the New Jersey State Council for Green Energy.

**Aisha Glover, Vice President of Urban Innovation, Audible**
Aisha serves as the Vice President of Urban Innovation at Audible where she works to develop innovative solutions to exemplify equitably and purposefully what a company can mean beyond what it does. She's worked in Audible's headquarters city of Newark, NJ for the past five years serving as the President & CEO for the Newark Alliance and Invest Newark. In both roles, she worked in partnership with Mayor Ras J. Baraka and oversaw a range of innovative and community-focused economic development initiatives for the state's largest City — Newark. Ms. Glover led the city's bid to attract Amazon for selection of its second headquarters, shortlisting them as one of the top 20 locations. Her work helped position Newark as a major destination city, strengthened the small businesses ecosystem, supported a thriving entrepreneurial base, and lead the attraction of corporations, investors and developers. Prior to joining the Newark team, Aisha served as the VP of External Affairs at the Brooklyn Navy Yard Development Corporation, the nonprofit organization that manages the Brooklyn Navy Yard, dubbed the nation's model for job creation and industrial development. There, she oversaw strategic partnership development, community engagement, public affairs and fundraising and played a key role in supporting the Yard's growing economic development initiatives.

**Lisa Jackson, Former EPA Administrator and Vice President of Environment, Policy, and Social Initiatives, Apple**
Lisa Jackson is Apple's vice president of Environment, Policy and Social Initiatives, reporting to CEO Tim Cook. Lisa oversees Apple's efforts to minimize its impact on the environment by addressing climate change through renewable energy and energy efficiency, using greener materials, and inventing new ways to conserve precious resources. She also leads Apple's $100 million Racial Equity and Justice Initiative, focused on education, economic opportunity, and criminal justice reform — and is responsible for Apple's education policy programs, its product accessibility work, and its worldwide government affairs function. From 2009 to 2013, Lisa served as Administrator of the US Environmental Protection Agency. Appointed by President Barack Obama, she focused on reducing greenhouse gases, protecting air and water quality, preventing exposure to toxic contamination, and expanding outreach to communities on environmental issues. She has also served as chief of staff to New Jersey Governor Jon S. Corzine and as commissioner of New Jersey's Department of Environmental Protection. Lisa holds a master's degree in Chemical Engineering from Princeton University and a bachelor's degree in Chemical Engineering from Tulane University. She serves on the boards of Tulane, SF Film, Conservation International, and the American Film Institute.

**Sean Jackson, Chief Executive Officer, Isles**
Sean Jackson is the CEO of Isles. Prior to this position, Sean served as a Trustee of Isles, and Chair of the Real Estate Development Committee. In early 2019, Sean stepped off Isles' Board of Trustees to oversee the completion of the Social Profit Center at Mill One, a 75k sq ft redevelopment project that is converting a formerly vacant historic mill into office, studio, and flex space. Previously, Sean was Senior Vice President of Rosemont Associates, where he assisted a wide variety of clients with government relations issues before federal, state, and local government officials and agencies. He worked with hospital systems, real estate development firms, environmental remediation specialists, an electric vehicle charging firm, and several Fortune 500 companies, and assisted in managing the remediation of a 35-acre industrial site in Jersey City. In addition, Sean managed development of properties in the City of Trenton on behalf of Woodrose Properties. He was also Of Counsel at the Murphy Orlando Law Firm in Jersey City. Prior to that, Sean served for four years as U.S. Senator Robert Torricelli's Chief of Staff in New Jersey. Sean was responsible for relations with the state and local elected officials, aiding municipalities with federally funded projects, overseeing New Jersey media relations, and managing a twenty-five person staff. Sean received his BA in history and political science from the University of Michigan and his J.D. from Rutgers Newark School of Law.

**John Kennedy, Chief Executive Officer, New Jersey Manufacturing Extension Program**
John is first and foremost a 'Jersey Boy', as he has always been proud of his home state and what it brings to the country…including significant Manufacturing, Engineering, Science, and R&D capabilities. As an Engineer and NJ Business Owner, John was focused on (both) Engineering & Manufacturing and enjoyed success through working with many incredible individuals. From Coleman Equipment to Sandvik to Barnett Industries to The Multitech Group. When John arrived at NJMEP in 2012, he found a place where he could support a critical industry while keeping New Jersey at the forefront of technology. NJMEP is his ultimate 'fit' as a professional. John is a proud Eagle Scout and National Distinguished Eagle. Kevin Lyons, Associate Professor of Supply Chain Archaeology, Rutgers University

**Dr. Kevin Lyons, Associate Professor of Supply Chain Archaeology, Rutgers University**
Dr. Lyons conducts research on developing and integrating global environmental, social, economic, ethical criteria and data into supply chain/procurement systems and processes. His research work includes the environmental and economic impacts on raw material extraction, logistics, manufacturing, consumption, consumer of multiple products and services research, designing and implementing local, national and international environmental economic development systems, waste-to-energy systems and environmental and sustainable social policy and financial impact forecasting (e.g. Sarbanes Oxley Corporate Social and Environmental Impact Reporting). He has also created the supply chain archeology and supply chain waste archeology research disciplines and has researched and written extensively on conducting environmental health-checks on global supply chains and the resulting benefits of reduced risk management impacts and costs. Lyons also serves as director of the Rutgers Business School Public Private Community Partnership Program. The recipient of many awards, here are a few of the most recently bestowed: Sierra Club Annual Professional of the Year Award, New Jersey State Governor's Award for Environmental Leadership and Excellence, NSF-IGERT grants (2).

**Debra Coyle McFadden, Executive Director, Work Environment Council**
Debra Coyle is the executive director of the NJ Work Environment Council (WEC). Coyle began her career at WEC in 1997 and served as the assistant director of WEC for ten years prior to being appointed executive director in 2018. She has more than twenty years of experience working on state and federal public policy, including policy development, advocacy, and worker/community training on various initiatives including chemical safety and security, sensible safeguards, climate change, healthy schools, workers' rights, income inequality and Right to Know. Coyle serves as a co-coordinator of the Jersey Renews coalition, with a focus on labor friendly climate policy. Coyle has given national presentations on topics such as the effects of climate change on worker health and safety and building effective coalitions. She has co-authored WEC reports Danger in the Dark, Failure to Act, and Access Denied in addition to contributing to national reports, most recently on COVID prevention and awareness in the workplace for the National Council for Occupational Safety and Health and Healthy Schools Network. She is a graduate of the Rutgers University Union Leadership Academy program and holds a bachelor's degree in Political Science from West Virginia University. In December of 2020 she was appointed to the NJ Economic Development Authority's NJ Wind Port for Diversity and Local Engagement Advisory Committee and in February 2021 she was appointed by Governor Murphy to serve on the Council on the Green Economy. She previously served on the Boards of the National Council for Occupational Safety and Health and the Philadelphia Chapter of the Coalition of Labor Union Women.

**Alli Gold Roberts, Director of State Policy, Ceres**
Alli Gold Roberts is the senior director of the Ceres state policy program. She leads the organization's efforts to mobilize companies and investors to advocate for stronger climate, clean energy, decarbonized buildings, and electric vehicle policies in almost 20 states across the country. Alli works to leverage the influential voice of the business community in key policy debates outlining the economic benefits of climate action and the growing operational leadership and action by the private sector. Alli has been with Ceres since 2014 and helped establish and grow the state policy program. Prior to joining Ceres, Alli worked at the MIT Joint Program on the Science and Policy of Global Change supporting media relations, stakeholder engagement, publications, and online communications. She previously worked as the New and Digital Media Director for the 2012 reelection campaign of Congresswoman Niki Tsongas. Alli also worked at the U.S. Environmental Protection Agency as an Oak Ridge Institute for Science and Education fellow in the Office of Wetlands, Oceans and Watersheds. Alli has a bachelor's degree in political science and environmental studies and a certificate in advanced leadership studies from American University. She is an EV driver, mom of two young kids and serves on her local Town Meeting.

**AJ Sabath, President/CEO, Advocacy & Management Group, Inc.**
AJ Sabath is the cofounder of Advocacy & Management Group, Inc. (AMG) a Trenton-based lobbying, association management and communications firm. AJ has spent 25 years working in government and politics in New Jersey. He has held many prominent positions in State government and is a veteran of many local, statewide and federal political campaigns. AJ has served as the Chief of Staff to the Senate President, Commissioner of the NJ Department of Labor and Workforce Development, and he has held several senior policy staff positions in the General Assembly and State Senate. He has been a regular member of the Politics NJ power list of New Jersey's 100 most politically influential personalities. Prior to his service in State government, AJ worked as Public Affairs Director for the MWW Group, as a Field Representative for the National Democratic Institute in Baku, Azerbaijan, and as an Organizer for the New Jersey Tenants Organization. Since 1990, AJ has been involved in some of the State's more significant political campaigns that has helped him win the respect of his colleagues on both sides of the aisle. AJ received his bachelor's degree in social work from Ramapo College of New Jersey. He is a former Chair of the Board of Trustees for Ramapo College of New Jersey where he still serves since being appointed by the Governor in 2005. AJ also serves as the President of the Board of the New Jersey Association of State Colleges and Universities — the leading voice for public higher education in New Jersey. AJ graduated from New York Military Academy in 1988.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# Endnotes


1 President Joseph Fiordaliso, Board of Public Utilities; Commissioner Robert Asaro-Angelo, Department of Labor; Chief Executive Officer Tim Sullivan, Economic Development Authority; Commissioner Shawn LaTourtte, Department of Environmental Protection.

2 The Council's definition of New Jersey's green economy comprised of the following five sectors: environmental infrastructure, grid infrastructure and storage, renewable generation and fuels, energy efficiency, and alternative vehicles.

3 There is some overlap across the stormwater and resiliency infrastructure sub-sector, as these employment estimates are more broadly defined than the other green sectors. Due to this overlap, job totals across stormwater and resiliency infrastructure should not be summed against other sectors, particularly with grid infrastructure or energy efficiency; summing employment across these sectors could possibly result in double-counting of jobs.

4 A job-year represents one year of work for one person. In other words, a new construction job that lasts five years would be considered five job-years. As an example, 86,700 job-years for the solar sector over 10 years translates to 8,670 solar jobs supported for the next 10 years.

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10 A job-year represents one year of work for one person. In other words, a new construction job that lasts five years would be considered five job-years. As an example, 86,700 job-years for the solar sector over 10 years translates to 8,670 solar jobs supported for the next 10 years.

11 Totals do not sum due to rounding.

12 Totals do not sum due to rounding.

13 A job-year represents one year of work for one person. In other words, a new construction job that lasts five years would be considered five job-years. As an example, 86,700 job-years for the solar sector over 10 years translates to 8,670 solar jobs supported for the next 10 years.

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