



Growing Green: Attracting Clean Energy Businesses and Jobs to New Jersey

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Executive Summary

Opportunity: Clean Energy Jobs

- As Renewable Energy (RE) and Energy Efficiency (EE) industries grow worldwide in response to public policy and venture capital investments, **New Jersey has unique opportunities to attract new, high-wage manufacturing, research & development, and corporate/headquarters jobs to the state.**
- The state's highly skilled workforce, transportation infrastructure, research and supply chains, and access to Mid-Atlantic regional and global markets are attractive to clean energy firms and compare well to competitor states.
- New Jersey has the key policy tools needed to attract manufacturing, R&D, and headquarters jobs, but the state could improve its position by adopting **key strategies for coordinating, targeting, and marketing its assets.**

Based on a review of efforts in competitor states, New Jersey should consider the following strategies:

- **Focus economic development efforts on key sectors** to build self-sustaining industry clusters.
- **Coordinate clean energy business recruitment**, including clean energy purchase incentives, business attraction incentives, and R&D programs.
- **Leverage existing programs and incentives** to support target clusters.
- **Expand outreach and marketing efforts** to clean energy firms in target sectors.
- **Strengthen investments in R&D and technology transfer** in clean technologies to speed commercialization of innovations developed at colleges and universities.
- **Align workforce education efforts with industry skill needs** to ensure a continued supply of skilled workers.



Executive Summary

New Jersey's Competitive Position: Tools for Business Attraction

New Jersey's policies and programs to attract clean energy companies compare favorably to those used in competitor states. Key strengths include:

The state's energy policies and programs create end-user markets and foster cluster development

- The *New Jersey Energy Master Plan (2008)* outlines plans for infrastructure improvements, policies, and programs designed to stimulate growth in RE/EE sectors. The EMP is also designed to save money for governments and companies by increasing efficiency and reducing energy use.
- *New Jersey Global Warming Response Act (2007)* and the *2009 Recommendations Report* include strategies to improve biofuels production, green building standards and operations, infrastructure for alternative fuel vehicles, and agricultural management for RE/EE.

Business attraction incentives are targeted to Clean Energy

- New Jersey Economic Development Authority (NJEDA) administers The Edison Innovation Clean Energy Manufacturing Fund to support manufacturing, and to support clean energy technology development and commercialization.
- NJEDA and the Board of Public Utilities coordinate the administration of the Renewable Energy Manufacturing Incentive program, which encourages purchase of solar components manufactured in NJ.

New Jersey also has other business attraction mechanisms that can be leveraged in support of clean energy firms

- From tax credits to loans and other incentives, New Jersey EDA has an array of programs that could be marketed to Clean Energy firms.

Executive Summary

Strengthening New Jersey's Position

To improve its competitive position, New Jersey should focus on **targeting key industries, improving the marketing and coordination of key energy programs and incentives, and accelerating technology transfer.**

These goals can be achieved with **minimal budget impact** by redeploying existing resources to achieve efficiencies through targeting specific industries and minimally reorganizing existing websites and agency responsibilities.

Clean energy industries offering potential for manufacturing, R&D, and headquarters job growth in New Jersey include:

- **Energy Efficiency:** New Jersey is home to companies such as Honeywell International. The state's Economic Development Authority, Board of Public Utilities, and utilities have made a strong commitment to EE programs, thus stimulating local demand.
- **Wind:** The New Jersey Energy Master Plan calls for the development of a large off-shore wind farm. With planning under way and New Jersey's access to Mid Atlantic markets, this provides an opportunity to attract wind-related firms to the state. Existing firms include Worldwater Wind and Solar and others.
- **Solar PV:** Current manufacturing infrastructure (glass, etc.) and expected increases in local demand make this another developing cluster.
- **Smart Grid ICT:** Experts predict strong growth in smart grid technology cluster nationwide. New Jersey's highly skilled workforce and its strong base of IT firms, including Fort Monmouth contractors and workers and a significant software development cluster, make the state an ideal location for smart grid firms. Emerging firms using smart grid technology include Petra Solar, which has received several grants from NJEDA.
- **Waste-to-Energy Biofuels and Energy Storage:** The state has R&D strength in chemicals and biopharma that could be repositioned for strong growth. Developing programs to enhance the state's capacity to create biofuels is also a key recommendation of the New Jersey Global Warming Response Act 2009 Recommendation Report.



Executive Summary

Key Recommendations

Goal	Suggested Steps	Examples from Other States
Coordinate Clean Energy Business Recruitment	Designate NJEDA as the state's Energy Coordinating Office to interact with businesses and coordinate state & federal programs and incentives and market them to target employers	<p>New York: New York State Energy Research and Development Agency</p> <p>California: California Alternative Energy and Advanced Transportation Financing Authority</p> <p>Colorado: Governor's Energy Office</p> <p>Michigan: Department of Energy, Labor, and Economic</p>
Leverage Existing Resources to Support Target Clusters	Create a clean energy R&D and light manufacturing park at Fort Monmouth that includes incubator facilities	<p>New York: Saratoga Technology and Energy Park</p> <p>Michigan: RE Renaissance Zones</p>
Expand Outreach and Marketing Efforts	<p>Expand foreign trade missions targeted to RE and EE employers</p> <p>Use NJEDA to create a targeted marketing campaign to attract firms in target clean energy clusters</p> <p>Use the New Jersey Energy Institute (see below) to organize existing employers, government officials, and university energy experts to recruit new companies to an existing clean energy cluster</p>	<p>Pennsylvania, Oregon, and Michigan targeted trade missions to recruit RE and EE companies in Europe and Asia to attract manufacturing jobs</p> <p>Virginia: Inter-agency Task Force for Energy Project Recruitment</p> <p>New York: Solar Technology Consortium</p> <p>Virginia: Inter-agency Task Force for Energy Project Recruitment</p>

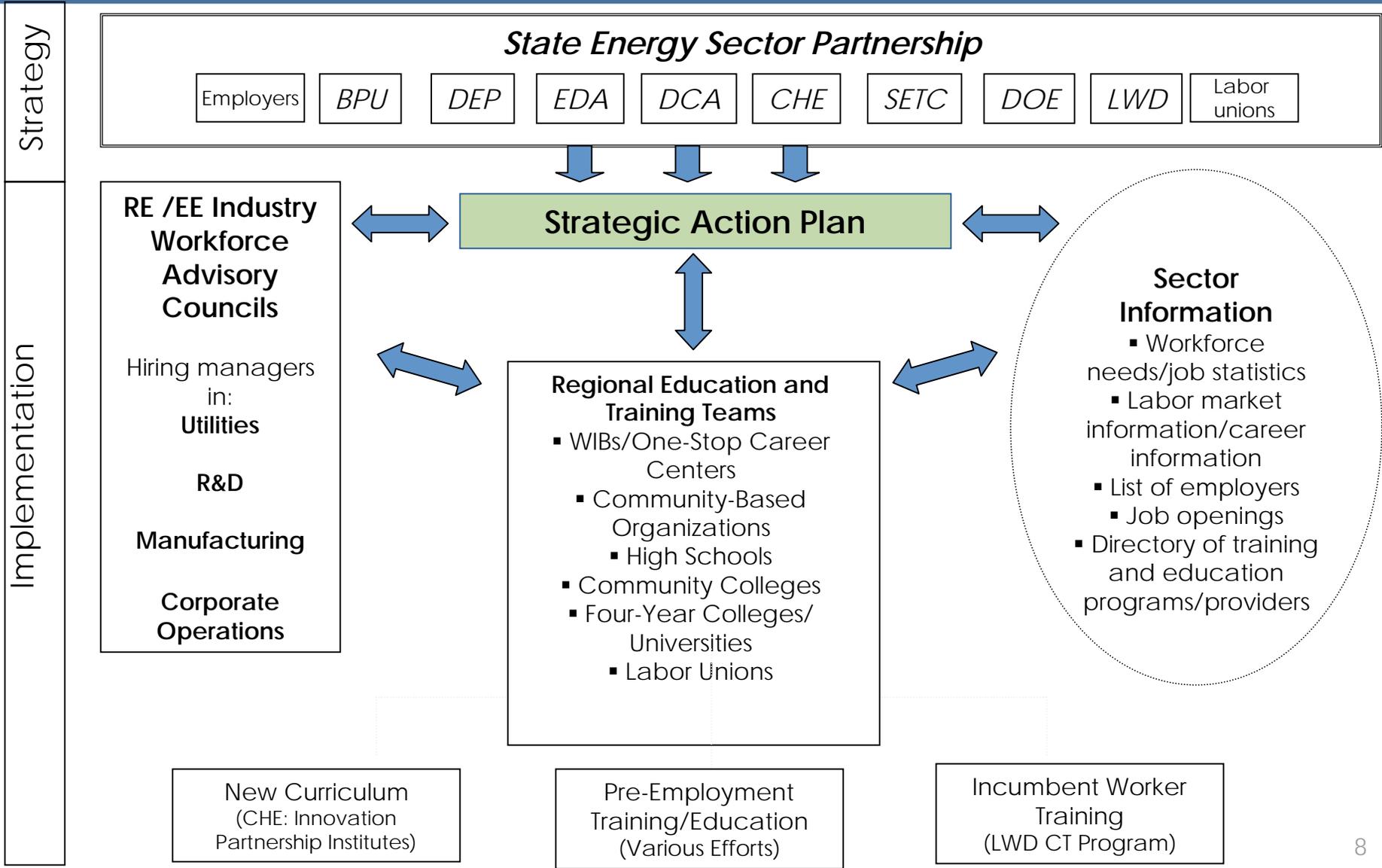
Executive Summary

Key Recommendations

Goal	Suggested Steps	Examples from Other States
Strengthen Investments in R&D and Technology Transfer	<p>Implement <i>New Jersey Energy Institute</i>, begun in 2009, to increase federal and corporate support for energy R&D by coordinating academic and applied R&D efforts and fostering development of joint funding proposals and industry/university partnerships.</p> <p>Consider using societal benefits charge revenues to support R&D and clean energy demonstration projects, as well as RE/EE programs</p>	<p>New York and Colorado support demonstration projects to prove the viability of new projects and improve tech transfer</p> <p>California: Uses public benefits charge revenues to support R&D efforts</p> <p>New York: Through its RE programs, New York uses public benefits charge funds to support R&D projects</p>
Align Workforce Education with Industry Skill Needs	<p>Develop state-level policy or legislation to improve alignment of higher education with industry skill and workforce needs</p> <p>Develop a Green Jobs Talent Network in coordination with the State Energy Sector Partnership (see next page for model)</p>	<p>Washington: Policies and laws promote and track alignment of higher education with industry needs.</p> <p>No models exist that address the workforce needs of R&D, corporate, and other high-wage jobs effectively. New Jersey would have the opportunity to be a national leader.</p>

Executive Summary

Model for a Green Jobs Talent Network



Executive Summary

Policy Implications and Detailed Recommendations

Governor Christie should consider the following key actions to strengthen New Jersey's ability to attract high-wage clean energy jobs:

- **To improve coordination and marketing of key incentives, designate NJEDA as New Jersey's Energy Coordinating Office.** As recommended in the report of the Subcommittee on Economic Development and Job Growth to Governor Christie's Transition Team, EDA can best support business development by managing all major energy incentives in the state, including the Clean Energy Program, which is currently managed by the Board of Public Utilities. Key models include The New York State Energy Research and Development Authority, Colorado's Governor's Energy Office, and Michigan's Department of Labor, Energy, and Economic Growth. Regional Greenhouse Gas Initiatives (RGGI) programs and others that involve utilities and impact utility rates should continue to be overseen by BPU, but should be tightly coordinated with those overseen by NJEDA.
- As advocated in the Fort Monmouth Redevelopment Plan, **designate redeveloped R&D facilities at Fort Monmouth as a research and light manufacturing park** for clean energy companies involved in developing smart grid technologies and other ICT applications in energy. Coordinate with EDA to identify early-stage companies. Saratoga Technology & Energy Park (STEP) program, which provides tax incentives for RE/EE office operations, lab facilities, and incubator facilities, provides a useful model. Michigan's Renewable Energy Renaissance Zones are similar and also leverage existing renaissance zone tax incentives to target Clean Energy companies in key sectors.
- **Implement the Energy Institute of New Jersey and expand its mission to include business recruitment** (e.g., the Solar Energy Consortium in New York). The Institute was an R&D coordination effort explored in 2008-09 to advance basic and applied EE/RE research across universities and corporate settings. Restructured and implemented, the institute can maximize support for energy R&D and market the state's clean energy R&D strengths to R&D and manufacturing firms.

Executive Summary

Policy Implications and Detailed Recommendations

- **Organize foreign trade delegations** of government, university, and business experts in clean energy to entice foreign-owned firms to the state. Some outreach can be done through attendance at international conferences, such as the Alliance to Save Energy Global Forum, which attracted participants from 40 countries last year.
- **Create the Talent Network for Clean Energy Jobs** by coordinating with and expanding the State Energy Sector Partnership to focus on high-wage R&D and corporate positions in clean energy in addition to RE/EE construction, installation and manufacturing jobs. A talent network can bring higher education together with business to ensure the existence of needed curricula to train a pipeline of skilled workers for key industries. This effort should be done in coordination with the **State Energy Sector Partnership** (an effort of the State Employment and Training Commission and the New Jersey Department of Labor and Workforce Development) and the **Innovation Partnership Institutes for EE/RE** (Commission on Higher Education).

The New Jersey legislature should consider:

- **Adopting laws that encourage improved alignment of education, including higher education, with industry skill needs.** Like in Washington State and a growing array of other states across the nation, this can be achieved by mandating that educational institutions use labor market information to make decisions about enrollments, recruitment strategies, new program development, and course content.

Executive Summary

Policy Implications and Key Recommendations

NJEDA should also consider the following:

- **NJEDA and other agencies should develop a targeted marketing campaign and leverage existing incentives to support clean energy firms**, including clean energy programs, Edison Innovation Zones, Urban Enterprise Zones, and other general business incentives, to firms in target industries to support cluster development. Leverage Urban Enterprise Zone funding and other tools to develop similar energy research clusters around key university research centers.
- If clean energy programs are moved to NJEDA, the agency should consider using the **Societal Benefits Charge** revenue that supports these EE and RE incentives to support research & development activities as well. This is the practice in New York and California and it serves to strengthen R&D efforts in clean energy sectors.



- **I. The Rapid Expansion of Green: The Potential for Growing High-Wage Clean Energy Jobs in New Jersey**

- II. Location Factors for Manufacturing, R&D, and Corporate Jobs in RE/EE: New Jersey's Competitive Position

- III. Promising Strategies for Attracting High-Wage Jobs in Clean Energy

Rapid Expansion of Green Jobs

Clean Energy Technology Comprises a Rapidly Growing Sector

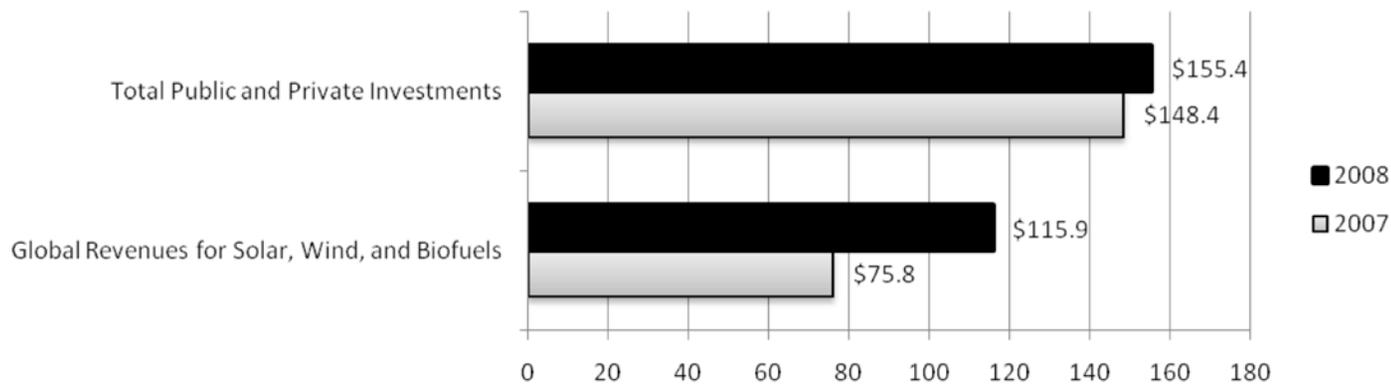
Clean Energy Technology Defined

- Clean energy technologies include products that improve energy efficiency (EE) or enable the use of clean and/or renewable energy (RE) sources such as solar, wind, biomass, geothermal, and others. This sector also includes investments to improve grid transmission, including smart grid technology.

Public and Private Investments Driving Growth

- While private investment declined somewhat in 2008 as a result of the recession, public investments are increasingly driving growth.
- Total public and private investments increased by 4.7% from \$148.4 billion in 2007 to \$155.4 billion in 2008. (Source: *New Energy Finance*, as found in *Clean Energy Trends 2009*, Cleantech Group, p. 2)
- Global revenues for solar, wind, and biofuels alone increased 53% from \$75.8 billion in 2007 to \$115.9 billion in 2008 and wind commanded over \$50 billion of the 2008 total. (Source: *Clean Edge*, as found in *Clean Energy Trends 2009*, Cleantech Group, p. 2)

Total Changes in Investment and Revenues (in billions), 2007-2008



Source: *New Energy Finance*, as found in *Clean Energy Trends 2009*, p. 2

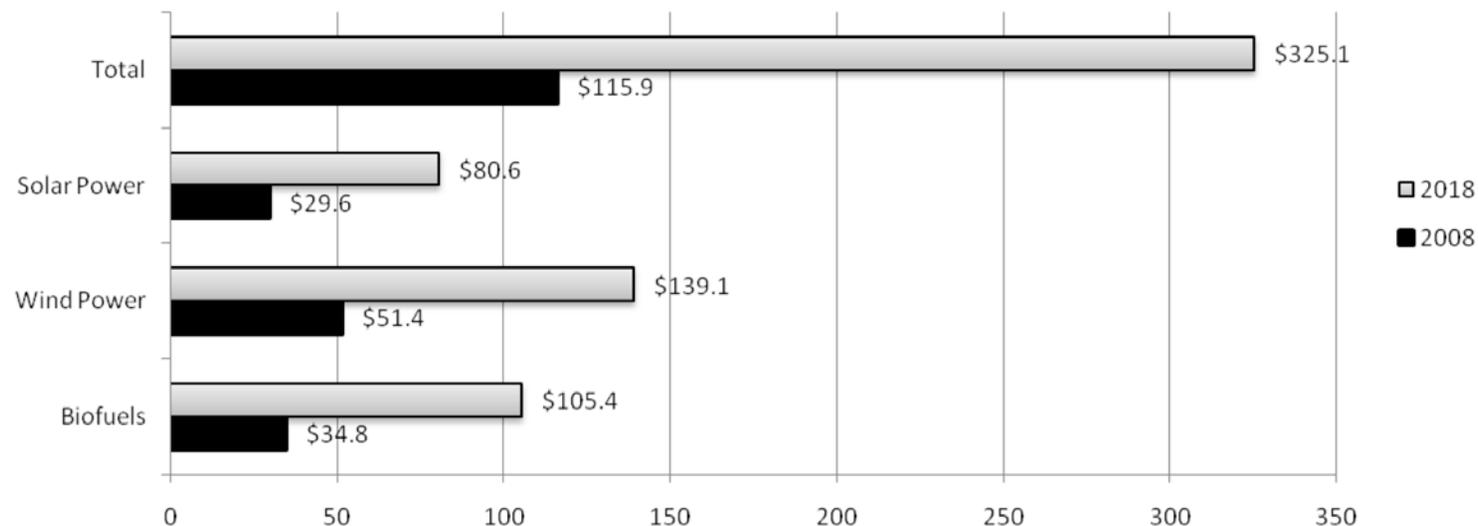
Rapid Expansion of Green Jobs

No single technology “winner” – instead, a mix of new and emerging technologies will compete

There was no single technology “winner” in 2009 – a mix of new and emerging technologies are projected to compete for some time

- Areas of current investment for clean energy manufacturing include **solar, wind, and biofuels**, which accounted for over half of all RE cross-border investments in 2007. (Source: Michel Lemagnen, *Harnessing the Sun and the Winds – New Energy For Foreign Direct Investment. Site Selection Magazine, 2009.*)
- While these areas will continue to grow, new areas of projected future investment growth include **smart grid ICT (including remote sensing and industrial design software), waste-to-energy biofuels, and energy storage**. (Source: Nicholas Parker, *Nicholas, Ten Clean Technology Predictions for 2010. Cleantech Group, 2009.*)

Global Clean-Energy Projected Growth (in billions), 2008-2018



Source: *Clean Tech Trends 2009, Cleantech Group, p. 5.*

Rapid Expansion of Green Jobs

The United States is the New Frontier for Global Investments in Clean Energy

- **U.S. national and state energy policies and private investments are driving demand and attracting more investors.**

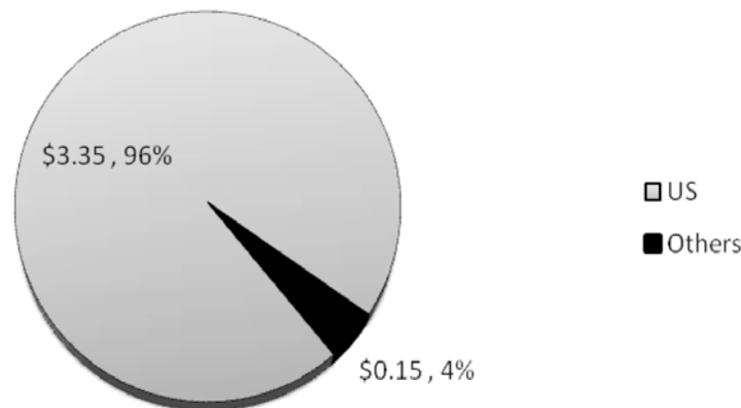
U.S. and State Energy Policy Driving End-Use Demand

- Over \$70 billion in American Recovery and Reinvestment Act funding will go to green energy-related programs, including more than \$500 million in clean energy funding for New Jersey. This funding will be invested in low-income EE projects, energy generation, and other projects.
- The New Jersey Energy Master Plan calls for \$33 billion in public and private utility investments to support RE/EE projects, with additional millions in savings anticipated through these investments.

As a result, U.S. Share of Global Private Venture Capital is on the Rise

- The European Union and the Asia-Pacific region have dominated the market for exportable jobs in clean energy (manufacturing, R&D, and corporate jobs) to date.
- But investment in creating U.S. clean technology jobs is rising. In the second and third quarters of 2009, U.S. private investment in clean technology surpassed investments in biotech and software. (Source: *Nicholas Parker, Ten Clean Technology Predictions for 2010, Cleantech Group, 2009, accessed December 1, 2009 at: <http://cleantech.com/news/5342/ten-cleantech-predictions-2010>.*)
- The United States today has an overwhelming share of global clean energy venture capital – \$3.35 billion of the \$3.5 billion global total. While much of this is still invested overseas, investments in North America are increasing. (Source: *New Energy Finance* (as quoted in *Clean Tech Job Trends 2009* p. 2).

U.S. Share of Global Venture Capital

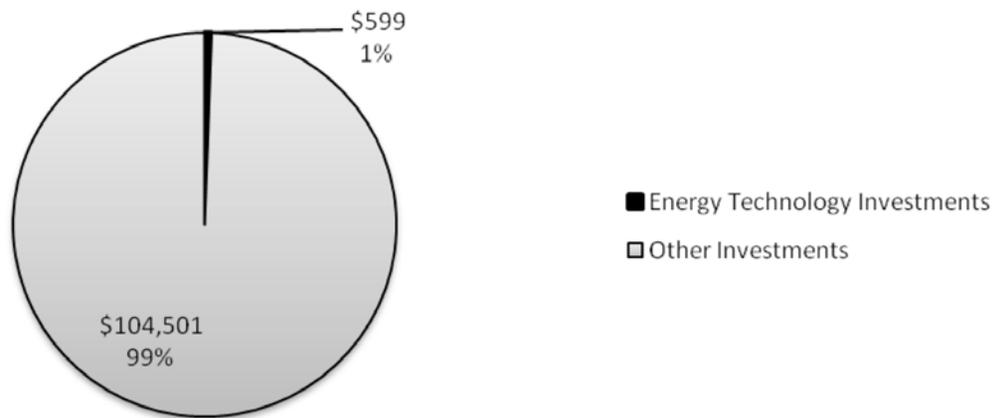


Source: *Clean Tech Trends 2009, Cleantech Group, p. 58.*

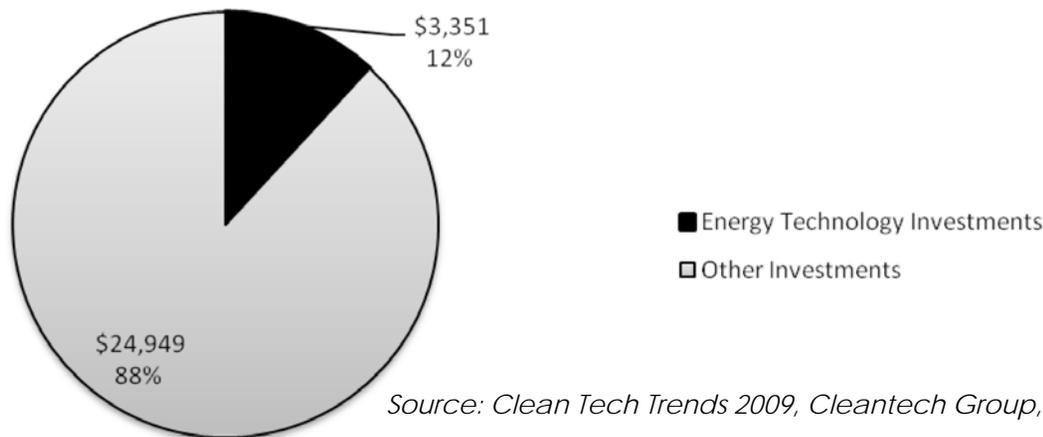
Rapid Expansion of Green Jobs

U.S. Firms Claim a Larger Share of Global Investment in Clean Energy, 2000-2008

Clean-Energy Venture Capital Investments in U.S.-Based Companies (in millions) as Percent of Total, 2000



Clean-Energy Venture Capital Investments in U.S.-Based Companies (in millions) as Percent of Total, 2008



Clean energy venture capital investments in U.S.-based companies grew from 1% to 12% of total market share between 2000 and 2008.

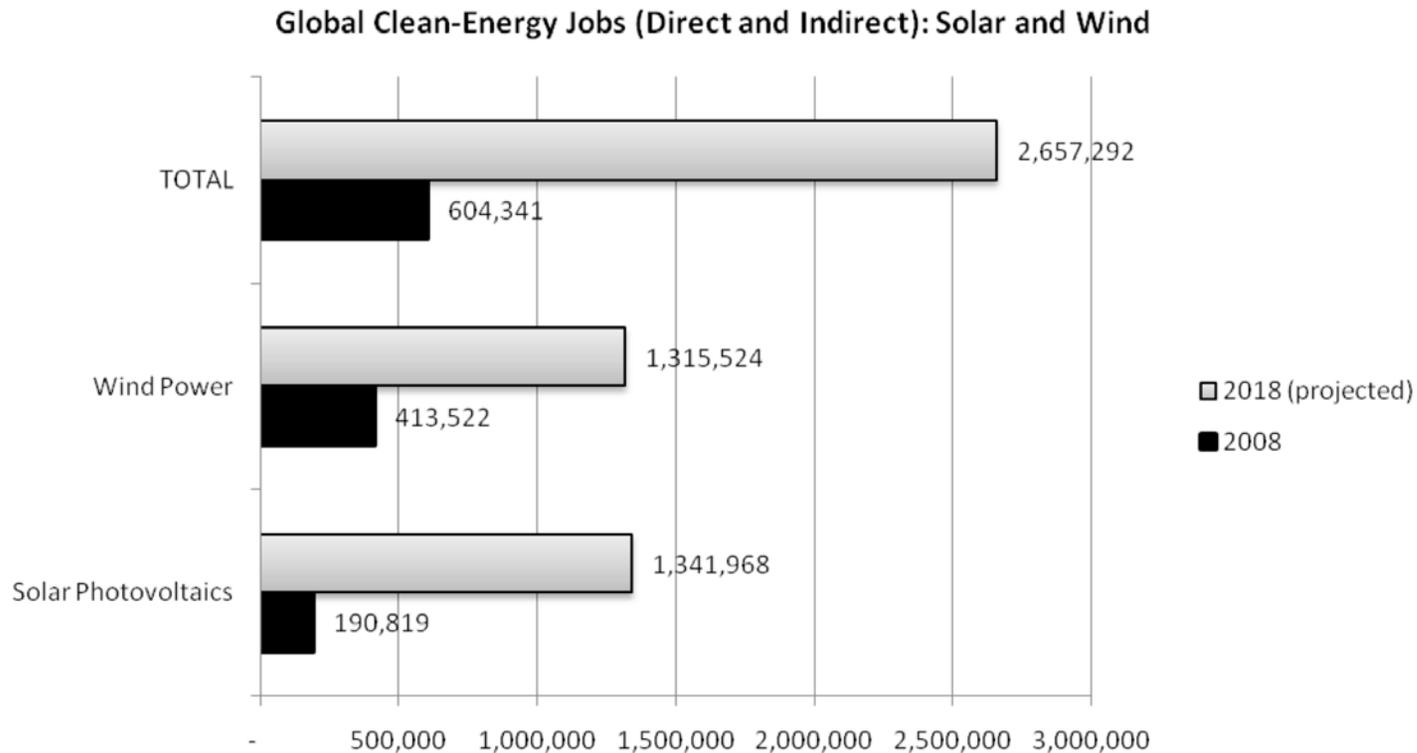
Over 54% of foreign direct investment in North America was dedicated to wind, solar, and biofuels manufacturing projects. (Source: "Attracting Biofuel Companies, Site Location Magazine, May 2009)

Source: Clean Tech Trends 2009, Cleantech Group, p. 3.

Rapid Expansion of Green Jobs

Projected Solar/Wind Job Growth 2008-2018

- As investment in U.S. clean energy companies has increased, the United States now projects significant employment growth in the development of solar photovoltaics and wind power over the coming decade.



Source: *New Energy Finance as displayed in Clean Tech Trends 2009, Cleantech Group, p. 2.*

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Location Factors for RE and EE

Location Factors Important to Clean Energy Technology Firms: An Overview

Key factors important to clean technology firms producing exportable jobs include:

Manufacturing

- Logistics costs (transportation + access to customers)
- Skilled workers
- Existence of cluster/supply chain
- Financing, incentives, and tax environment
- Energy costs

R&D

- R&D base
- Highly skilled workers
- Tech transfer capacity
- Financing, incentives, and tax environment

Corporate Operations

- Highly skilled workers
- Access to partners
- Financing, incentives, and tax environment

Location Factors for RE and EE

Key Location Factors for Clean Energy *Manufacturing*

Increasingly, manufacturers of clean energy products are concerned about lowering logistical costs by placing operations in areas with a strong transportation infrastructure, and close proximity to end-use markets (Clean Energy Trends, 2009)

- This desire to lower logistical costs is especially important for manufacturers of large components that are costly to transport, such as wind turbine manufacturers.
- Due to the need to transport large components cheaply and efficiently, wind manufacturers especially prefer access to ports and rivers, as well as rail and highway.
- The desire for manufacturers to be close to end-use markets stresses the importance of strong energy policies to promote demand, an area in which New Jersey excels.

Other factors important to many clean energy equipment manufacturers are:

- A reliable manufacturing supply chain,
- Access to skilled workers with transferable skills from related industries (e.g., steel workers for wind manufacturing),
- Access to R&D resources through research firms and universities, and
- Access to natural resources needed for manufacturing (e.g., silica deposits for silicon-based solar PV manufacturing).

Incentives are also important, though more for some (RE) industries than others

- Solar manufacturing and other technologies that have not yet gained wide market appeal due to high costs may be more responsive to incentives than other types of RE/EE businesses. (Don Schjeldahl and Margaret Grissom, "Solar Energy and the Disproportionate Importance of Incentives," *Site Selection Magazine*, 2009, accessed on July 10, 2009 at: www.siteselection.com/theenergyreport/2009/june/incentives.)

Location Factors for RE and EE

Key Location Factors for Clean Energy *Research & Development and Corporate Administration*

The following factors are generally considered important among firms in clean energy industries:

R&D

- Presence of similar R&D efforts in the region is important to create economies of scale and access to local knowledge and partners
- Highly skilled workers focused on key technology areas limits recruitment costs
- Presence of manufacturing production facilities allows for the transfer of ideas to production
- Being located in a state with a global R&D strategy provides access to markets and ideas
- Possibility of tech transfer through local universities improves **likelihood** of moving new products to market and working effectively with university-based researchers
- Policy support for incubators, financing, and other R&D activities is also important

Corporate Administration

- Access to highly skilled workers knowledgeable about the industry is important to corporate employers
- The presence of established industry clusters provides access to key partners
- Strong base of administrative/support services can make it less costly to support corporate business operations
- Financing and incentives, as well as the business tax environment, can also be determinants in site location for corporate operations

Location Factors for RE and EE

New Jersey's Key Strengths: Energy Policies and Programs

New Jersey's energy policies can attract clean energy manufacturing, R&D, and headquarter firms.

- State energy policies and programs create end-user markets and foster cluster development.
- Manufacturing firms prefer to locate close to the end user to lower logistics costs.
- R&D and headquarter firms more likely to locate within a well-supported cluster that includes manufacturing.

Key energy policies include:

- **New Jersey Energy Master Plan (2008)**
Key investments in EE/RE programs and infrastructure improvements will drive down energy use and reduce cost burdens on clean energy businesses.
- **New Jersey Global Warming Response Act (2007) and the 2009 Recommendations Report**
Includes strategies to improve biofuels production, green building standards and operations, infrastructure for alternative fuel vehicles, and agricultural management for RE/EE

New Jersey Initiatives that Increase Demand for EE/RE and Grow End-Use Markets

NJ Clean Energy Program - Administered by the Board of Public Utilities, the NJCEP includes the *Renewable Energy Manufacturing Incentive Program (REMI)*, which provides rebates for purchasing solar equipment manufactured in the state. In addition, numerous incentives are available for businesses and homeowners to encourage EE/RE upgrades.

Other key efforts include:

- Participation in the Regional Greenhouse Gas Initiative (RGGI)
- Classification of CO₂ as a pollutant in New Jersey
- New Jersey Renewable Portfolio Standard
- New Jersey Consolidated Energy Savings Program
- New Jersey Cool Cities Initiative
- New Jersey Clean Cities Program / Sustainable New Jersey – a grassroots efforts to certify “green” municipalities
- Executive Order to Promote Energy Efficiency
- New Jersey Green Homes Office
- RE /EE Research efforts at key universities

Location Factors for RE and EE

New Jersey's Key Strengths: Business Attraction

Creating favorable tax and incentive programs for business attraction is another strategy states use to build market share in clean energy manufacturing, R&D, and corporate headquarters operations. In the current economic recession, however, it is likely that many states are cutting back on such direct incentives. Some states, including California, have never had very many of these, but have relied instead on growing end-use markets to build a fertile consumer market for clean energy businesses.

The **New Jersey Economic Development Authority (NJEDA)** administers programs to attract clean energy manufacturing and R&D businesses to the state, including:

The Edison Innovation Clean Energy Manufacturing Fund (CEMF) provides qualified manufacturers with up to \$3.3 million in grants and interest-free loans. The fund is coordinated with New Jersey's

Renewable Energy Manufacturing Incentive (REMI) program, administered by the Board of Public Utilities, which provides rebates to those who purchase solar panels and related equipment manufactured in New Jersey.

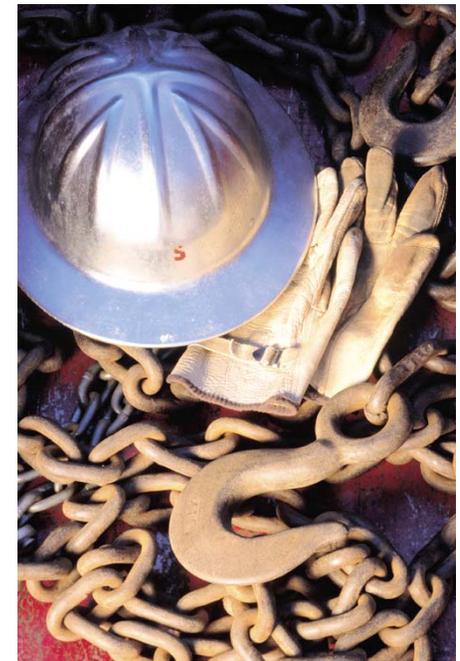
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NJEDA also manages a host of other general business incentive programs that may be leveraged to address the needs of Clean Energy businesses.

Location Factors for RE and EE

New Jersey's Key Strengths: Clean Energy Workforce, Firms, and Other Factors

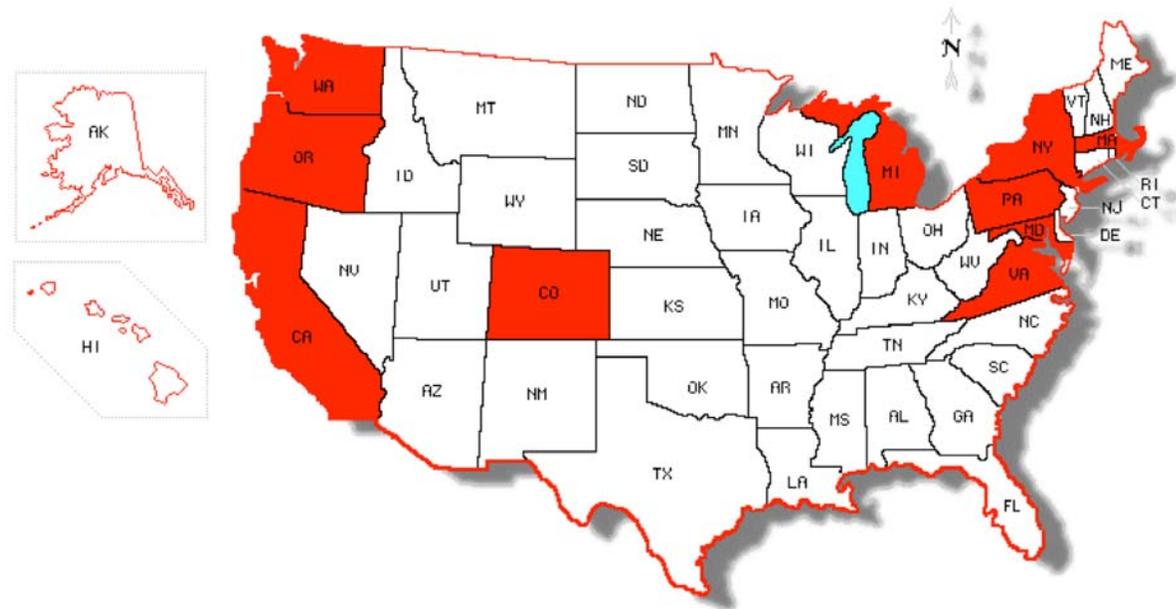
- New Jersey currently has over 2,100 firms directly or indirectly involved in solar, wind, and biofuels manufacturing and R&D that provided over 64,000 jobs in 2009. (Source: New Jersey Department of Labor and Workforce Development, *New Jersey Going Green, A Demand-Supply Analysis of Current and Potential Green Jobs and Green Skills*, Division of Labor Market and Demographic Research, 2009.)
- The state is also home to a highly skilled workforce and the state has a strong R&D base, as well as manufacturing facilities that can provide firms with the infrastructure and knowledge they need to build upon.
- Several universities in the state focus R&D efforts on clean energy areas, including waste remediation, solar photovoltaics, and energy storage.
- New Jersey has excellent transportation resources for attracting clean energy businesses, especially in manufacturing. Rivers and ports can accommodate large wind turbine parts, and highways, rail, and air transport provide additional options. In addition, New Jersey is in an ideal location to provide companies with access to nearby markets in Mid-Atlantic states.
- Other existing business clusters in NJ, such as biopharma, may attract biofuel manufacturers and R&D firms.
- Like other businesses, manufacturing, R&D, and corporate headquarter firms in the clean energy sector are likely to view New Jersey's highly skilled workforce, transportation and manufacturing infrastructure, research and supply chains, and access to Mid-Atlantic regional and global markets favorably.



Location Factors for RE and EE Comparison States

In the following section, New Jersey's performance in key high-tech economy indicator areas important to clean energy technology firms is compared to that of 10 other states:

- California
- Colorado
- Maryland
- Massachusetts
- Michigan
- New York
- Oregon
- Pennsylvania
- Virginia
- Washington



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These states represent states in close proximity to New Jersey, those with similar economic structures, as well as states with competitive energy policies and programs.

Location Factors for RE and EE

Key Economic Indicators

General high-tech economic indicators provide benchmarks that allow New Jersey to assess its current performance in sectors related to clean technology.

The following section describes how New Jersey ranks and performs versus comparison states on key indicators that include factors important to clean technology firms, including:

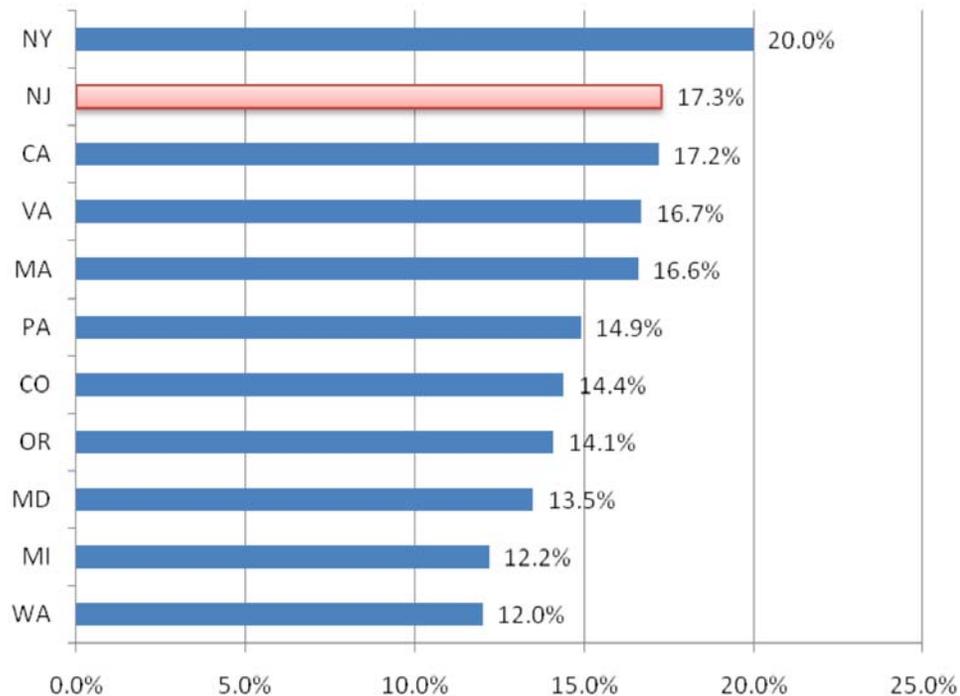
- **Access to Skilled Workers**
- **Manufacturing and R&D Base Indicators**

Location Factors for RE and EE

New Jersey Enjoys a High-Wage Economy...

State	Rank
NY	3
NJ	5
CA	6
VA	8
MA	9
PA	14
CO	16
OR	17
MD	22
MI	31
WA	32

Percentage of Service Jobs in High-Wage Traded Sectors among All Jobs, 2008



Indicator: High-Wage Traded Services

The share of employment in traded service sector in which the average wage is above the national median for traded services.

Why is this Important? Traded services accounted for 18% of private-sector employment in 2005. Many of these pay wages above the national average. Moreover, in the New Economy, services are increasingly the only part of a region's economic base that is experiencing employment growth. Indeed, the IT revolution has enabled a growing share of information-based services to be physically distant from the customer while remaining functionally close. In the New Economy, these and a host of other industries are now traded, as consumers can use the Internet and telephone to consume these services from companies not necessarily located in their communities.

In 2008, 17.3% of all jobs in New Jersey were service jobs in high-wage traded sectors. New Jersey ranked 2nd among the 11 comparison states and 5th among all states in the United States by the indicator of high-wage traded services.

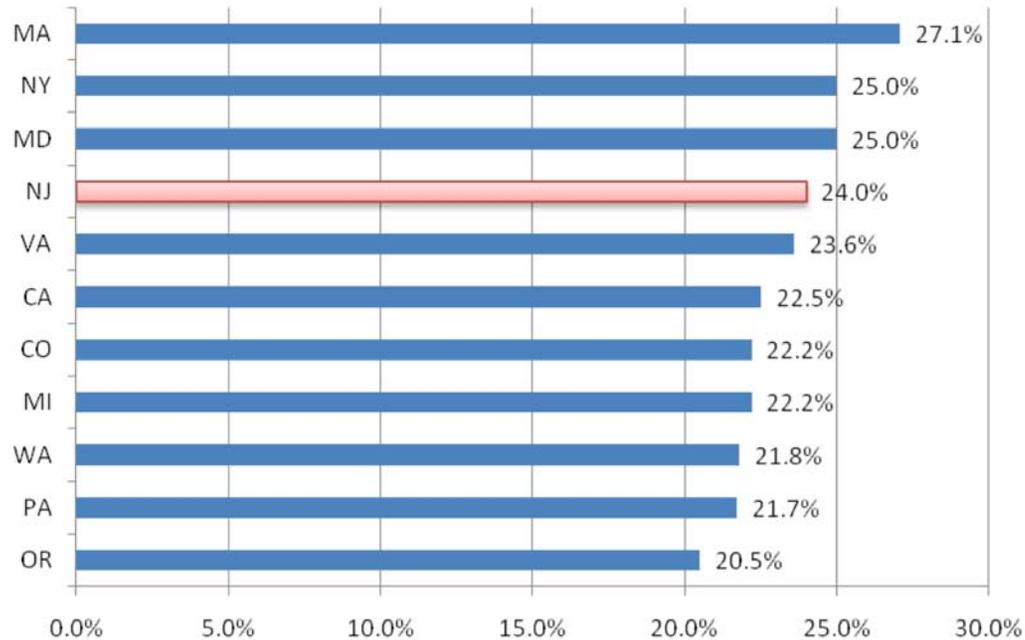
Source: 2008 State New Economy Index, Indicator: High Wage-Traded Services, Based on: U.S. Department of Labor, Bureau of Labor Statistics, Quarterly Census of Employment and Wages (2006).

Location Factors for RE and EE

...as a Result, the State has a Strong Base of Highly Skilled Professional and Technical Workers

State	Rank
MA	1
NY	2
MD	3
NJ	6
VA	8
CA	11
CO	12
MI	13
WA	15
PA	16
OR	24

Percentage of Jobs Held by Managers, Professionals, and Technicians among All Jobs, 2008



Indicator: Managerial, Professional, and Technical Jobs

Managers, professionals, and technicians as a share of the total workforce.

Why is this Important? As more routine jobs are automated or offshored and as the economy becomes more complex and knowledge-based, managers, professionals, and technicians are playing a more important role in the economy.

Source: 2008 State New Economy Index, Indicator: Managerial, Professional, and Technical Jobs, Based on:

- *IT Occupations: Managerial, Professional, and Technical Jobs: U.S. Department of Labor, Bureau of Labor Statistics, May 2007 Occupational Employment Statistics (2008).*
- *Total Employment: U.S. Department of Commerce, Bureau of Economic Analysis, 2006 Regional Economic Accounts (2007).*

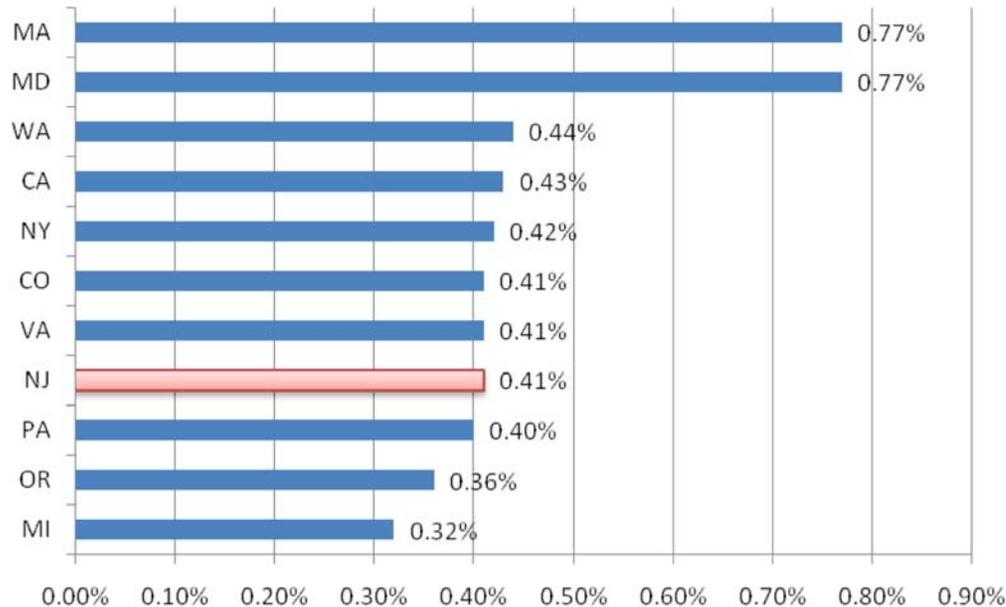
In 2008, New Jersey had 24% of its total jobs held by highly skilled managers, professionals, and technicians. The state ranked 4th among the 11 comparison states and 6th among all states in the United States.

Location Factors for RE and EE

New Jersey Ranks 12th Nationwide, and 8th Among Competitor States, for Percentage of Scientists & Engineers in the Workforce

State	Rank
MA	1
MD	2
WA	7
CA	8
NY	9
CO	10
VA	11
NJ	12
PA	13
OR	15
MI	20

Scientists and Engineers as a Percentage of the Workforce, 2008



New Jersey had 0.41% scientists and engineers as a percentage of the workforce in 2008. The state ranked 6th (a three-way tie) among the 11 competitor states and 12th among all states in the United States.

Indicator: Scientists and Engineers
Scientists and engineers as a percentage of the state workforce.

Why is this Important? In spite of the concern about the “brain drain” of newly minted scientists and engineers to other states, the correlation between the number of employed Ph.D. scientists and engineers, and Ph.D. degrees in science and engineering from universities, in the state is remarkably high (0.97). So, growing or attracting a quality scientific workforce is critical to continued economic growth.

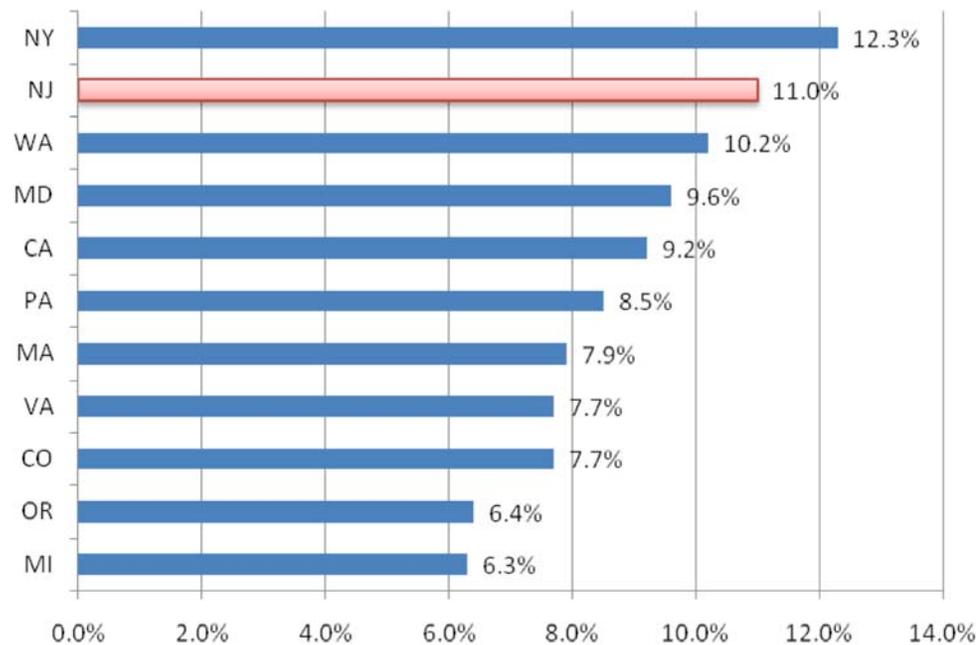
*Source: 2008 State New Economy Index
Indicator: Scientists and Engineers,
Based on:
Scientists and Engineers: National
Science Foundation, Science and
Engineering State Profiles 2005-2007
(May 2008).
Total Employment: U.S. Department of
Commerce, Bureau of Economic
Analysis, Regional Economic Accounts
(2006).*

Location Factors for RE and EE

New Jersey has a Fast-Growing Technical Sector

State	Rank
NY	2
NJ	3
WA	4
MD	7
CA	9
PA	11
MA	17
VA	21
CO	22
OR	28
MI	31

"Gazelle" Jobs: Jobs in Fast-growing Companies as a Percentage of Total Employment, 2008



Indicator: "Gazelle" Jobs

Jobs in gazelle companies (firms with annual sales revenue that has grown 20% or more for four straight years) as a share of total employment.

Why is this Important? The prevalence of new, rapidly growing firms—gazelles—is the sign of a dynamic and adaptive state economy. States that offer fertile ground for the entrepreneurial activity that spawns gazelles reap the harvest of robust job creation.

Source: 2008 State New Economy Index,

Indicator: "Gazelle" Jobs, Based on: Gazelles: National Policy Research Council (2007).

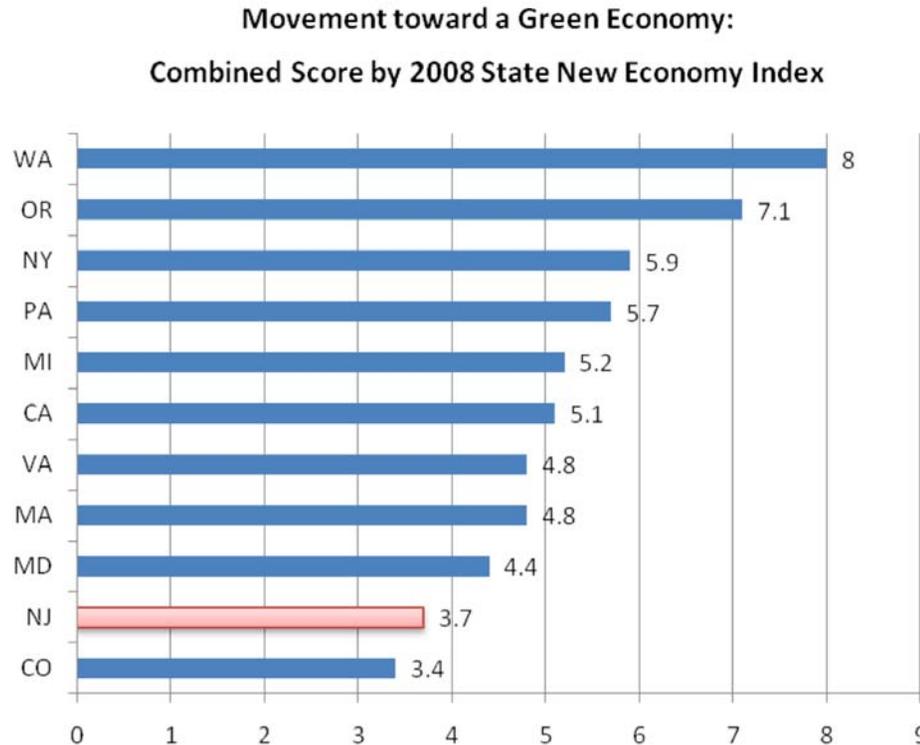
Employment: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts (2006).

In 2008, New Jersey had 11% of jobs in fast-growing companies. The state ranked 2nd among the 11 competitor states and 3rd among all states in the United States.

Location Factors for RE and EE

New Jersey has Begun to Move Toward a Greener Energy Economy

State	Rank
WA	1
OR	4
NY	9
PA	14
MI	18
CA	24
VA	27
MA	28
MD	34
NJ	48
CO	49



Indicator: Movement Toward a Green Economy

The change in energy consumption per capita and the change in renewable energy consumed as a percentage of total energy.

Why is this Important? Reduced consumption of carbon-intensive energy sources is an important emerging component of economic vitality. In addition, given the likelihood of some kind of CO₂ emission charges being imposed nationally, states with lower carbon electricity-generating systems (e.g., nuclear and renewables) could be better positioned economically going forward.

Source: 2008 State New Economy Index, Indicator: Movement Toward a Green Economy,

Based on:

Energy Consumption 2005: Energy Information Administration, "Annual Energy Review 2007" (June 2008).

Energy Consumption 2000: Energy Information Administration, "Annual Energy Review 2002" (June 2003).

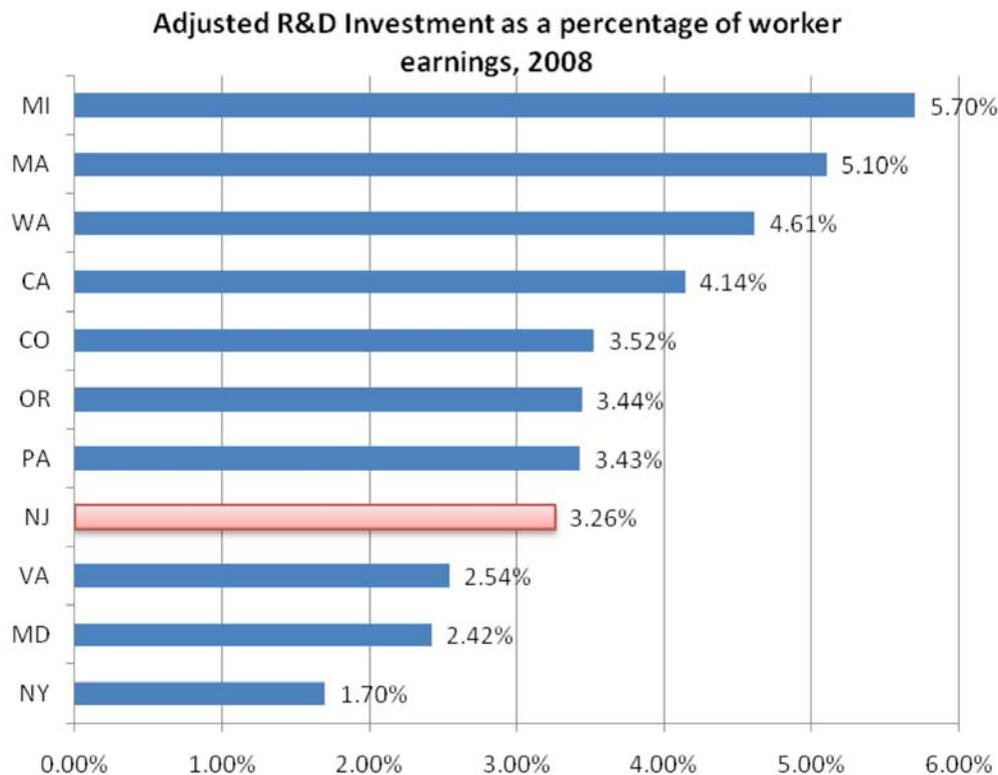
New Jersey was scored 3.7 in "Movement toward a Green Economy" by the State New Economy Index. This score ranked 10th among the 11 competitor states, and 48th among all states in the United States.

New Jersey's Energy Master Plan, implemented in late 2008, is likely to increase the state's ranking in this category.

Location Factors for RE and EE

Industry R&D Investment is Generally Lower than in Comparison States, but Higher than in Most of the Nation

State	Rank
MI	2
MA	4
WA	5
CA	7
CO	10
OR	11
PA	12
NJ	13
VA	19
MD	20
NY	32



Indicator: Industry Investment in R&D

Industry-performed research and development as a percentage of total worker earnings.

Why is this Important? Research and development, which yield product innovations and adds to the knowledge base of industry, is a key driver of economic growth. Business provides just under two-thirds of all R&D funding.

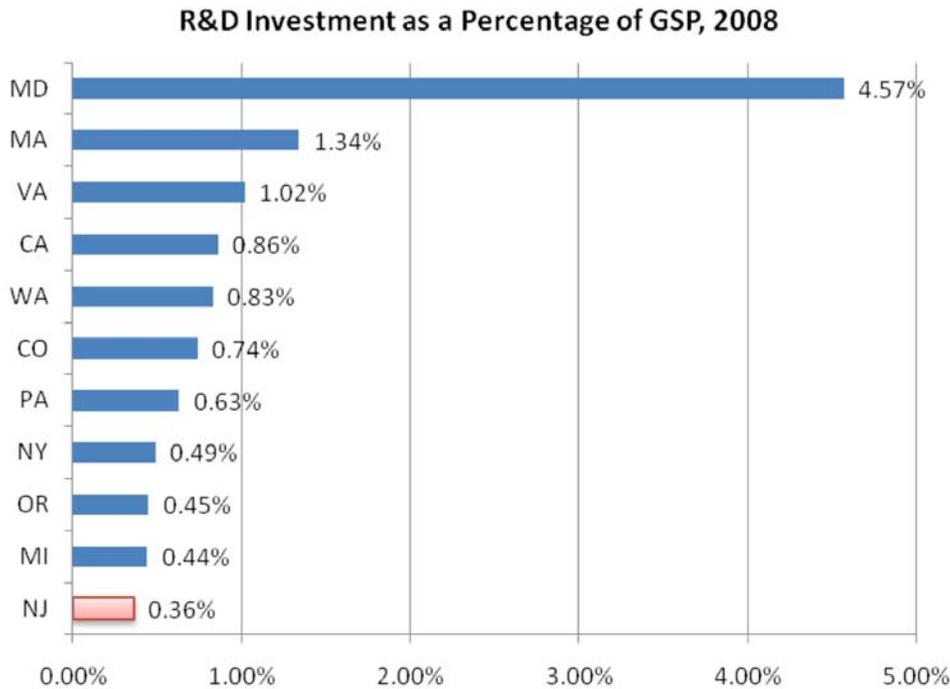
Source: 2008 State New Economy Index, Indicator: Industry Investment in R&D, Based on: Industry R&D: National Science Foundation, InfoBrief (2007). Employment: U.S. Department of Labor, Bureau of Labor Statistics, Quarterly Census of Employment and Wages (2006). Employment Compensation: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts (2006).

In 2008, New Jersey ranked 8th among the 11 competitor states and 13th among all states in the United States for industry investment in R&D, which is measured by adjusted R&D investment as a percentage of worker earnings.

Location Factors for RE and EE

Non-Industry Investment in R&D is Low Due to the Small Number of Universities in the State

State	Rank
MD	2
MA	3
VA	6
CA	7
WA	10
CO	12
PA	19
NY	30
OR	31
MI	32
NJ	42



Indicator: Non-Industry R&D

Non-industry research and development as a percentage of GSP.

Why is this Important? While non-industry investment in R&D is only about one-third as large as industry R&D, the federal, state, university, and nonprofit investments in R&D have had a substantial impact on innovation. Moreover, non-industry R&D helps lay the foundation for profitable future private-sector research.

Source: 2008 State New Economy Index, Indicator: Non-Industry R&D, Based on:

State-based data—National Science Foundation, State Agency Research and Development Expenditures: Fiscal Year 2006 (May 2008).

Non-state-based data: National Science Foundation, National Patterns of R&D Resources: 2004 (September 2007).

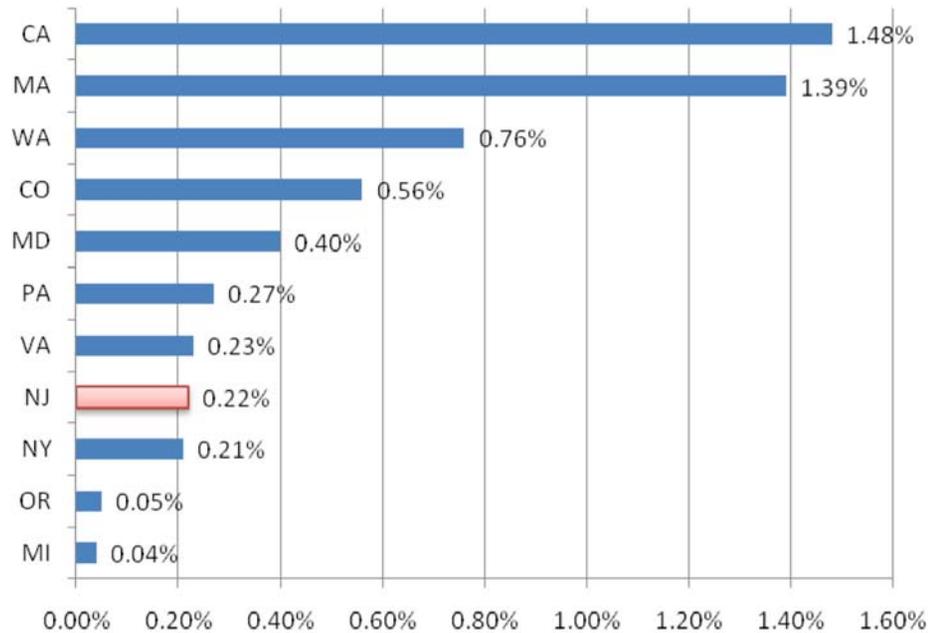
New Jersey's non-industry investment in R&D shared 0.36% of its Gross State Product (GSP) in 2008. The state ranked 11th among the 11 competitor states and 42nd among all states in the United States.

Location Factors for RE and EE

Venture Capital Availability in New Jersey is Competitive with Some Comparison States, and Robust Compared to the Nation

State	Rank
CA	1
MA	2
WA	3
CO	4
MD	5
PA	11
VA	13
NJ	16
NY	17
OR	34
MI	38

Venture Capital as a Percentage of Worker Earnings, 2008



Indicator: Venture Capital

Venture capital invested as a share of worker earnings.

Why is this Important? Venture capital is an important source of funding for new, fast-growing entrepreneurial companies. In effect, venture capitalists identify promising innovations and help bring them to the marketplace. Venture-backed firms are also an important source of job growth.

Source: 2008 State New Economy Index,

Indicator: Venture Capital

Based on:

Venture Capital: PricewaterhouseCooper/Venture Economics/NVCA MoneyTree Survey (2008).

Worker Earnings: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts (2007).

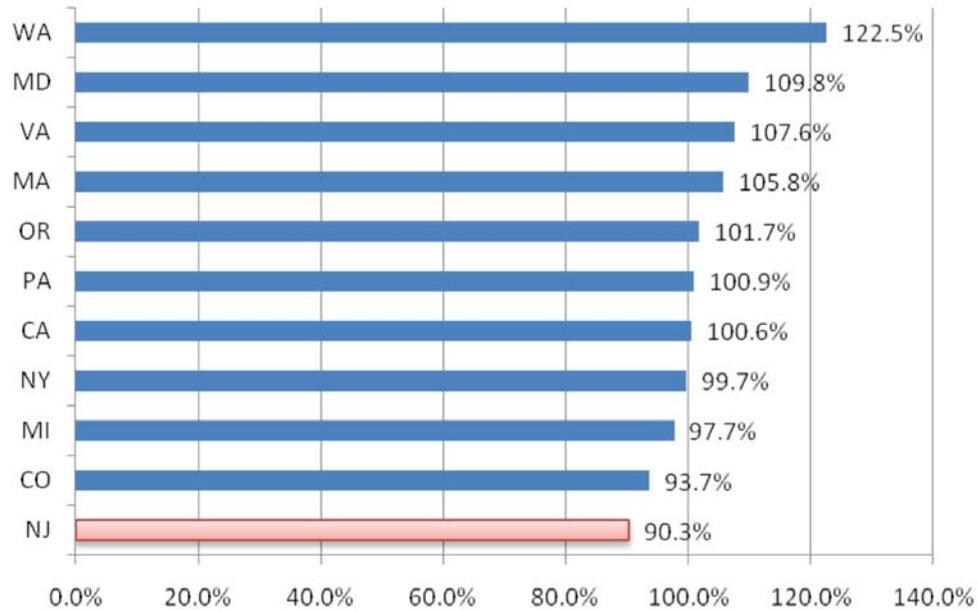
New Jersey's venture capital as a percentage of worker earnings in 2008 was 0.22%, which ranked 8th among the 11 competitor states and was in the top third of all U.S. states with an overall rank of 16th.

Location Factors for RE and EE

The State's Value-Added for Manufacturing Needs Improvement

State	Rank
WA	1
MD	3
VA	4
MA	8
OR	10
PA	13
CA	16
NY	20
MI	26
CO	37
NJ	41

Manufacturing Value-added as a percent of U.S. average, 2008



Indicator: Manufacturing Value-Added

Manufacturing value-added per production hour worked as a percentage of the national average, adjusted by industrial sector.

Why is this Important? Within manufacturing, high value-added sectors tend to be those that are capital intensive and producing technologically complex products. And, within sectors, firms with higher value-added levels, all else being equal, are better equipped to meet competitive challenges, both at home and abroad.

Source: 2008 State New Economy Index, Indicator: Manufacturing Value-Added, Based on: U.S. Census Bureau, "Geographical Area Statistics: 2006," Annual Survey of Manufacturers (May 2006).

New Jersey's manufacturing value-added was about 10% lower than the U.S. average in 2008. The state ranked 11th among the 11 competitor states and 41st among all states in the United States.

Location Factors for RE and EE

Summary of New Jersey Performance on Comparison Indicators

Competitive Strengths

New Jersey has a strong high-tech jobs base to build upon

- NJ ranks second among 10 other competitor states for the percentage of high-wage traded sector jobs (17.3%) and fourth for the percentage of jobs held by managers and professionals (24%).
- The New York-Northern New Jersey-Long Island NY-NJ-CT-PA metropolitan area ranked third in the nation for clean energy job activity based on an index of jobs, investments, and patent activity. The only regions ranked higher were in California.

The state's Energy Master Plan and related programs help to create end-use markets important to manufacturers

- EMP investments will support the Clean Energy Program, infrastructure improvements, and other projects and programs that will support and grow end use markets. Besides supporting the adoption of RE/EE technology throughout the economy, these investments will generate additional billions in savings for businesses and residents, driving down the state's high energy costs.

New Jersey has excellent access to transportation, basic manufacturing infrastructure, and Mid-Atlantic markets

Areas for Improvement

Investments in R&D are lower than in comparison states

- While industry investment in R&D is somewhat competitive, non-industry investments are less competitive due to the limited number of universities receiving federal R&D grants.

The state's manufacturing sector is less technically advanced than in many comparison states

- New Jersey ranks 41st in the nation with regard to the value-added provided by the state's manufacturing sector, indicating a less technically advanced system
- Attracting advanced manufacturing facilities in clean energy may help to reverse this trend.

- I. The Rapid Expansion of Green: The Potential for Growing High-Wage Clean Energy Jobs in New Jersey
- II. Location Factors for Manufacturing, R&D, and Corporate Jobs in RE/EE: New Jersey's Competitive Position
- **III. Promising Strategies for Attracting High-Wage Jobs in Clean Energy**

Attracting High-Wage Clean Energy Jobs

State Policymakers can have an Important Influence on Clean Energy Technology Business Location

Based on a review of state strategies, policy options for attracting RE/EE fall into four broad categories

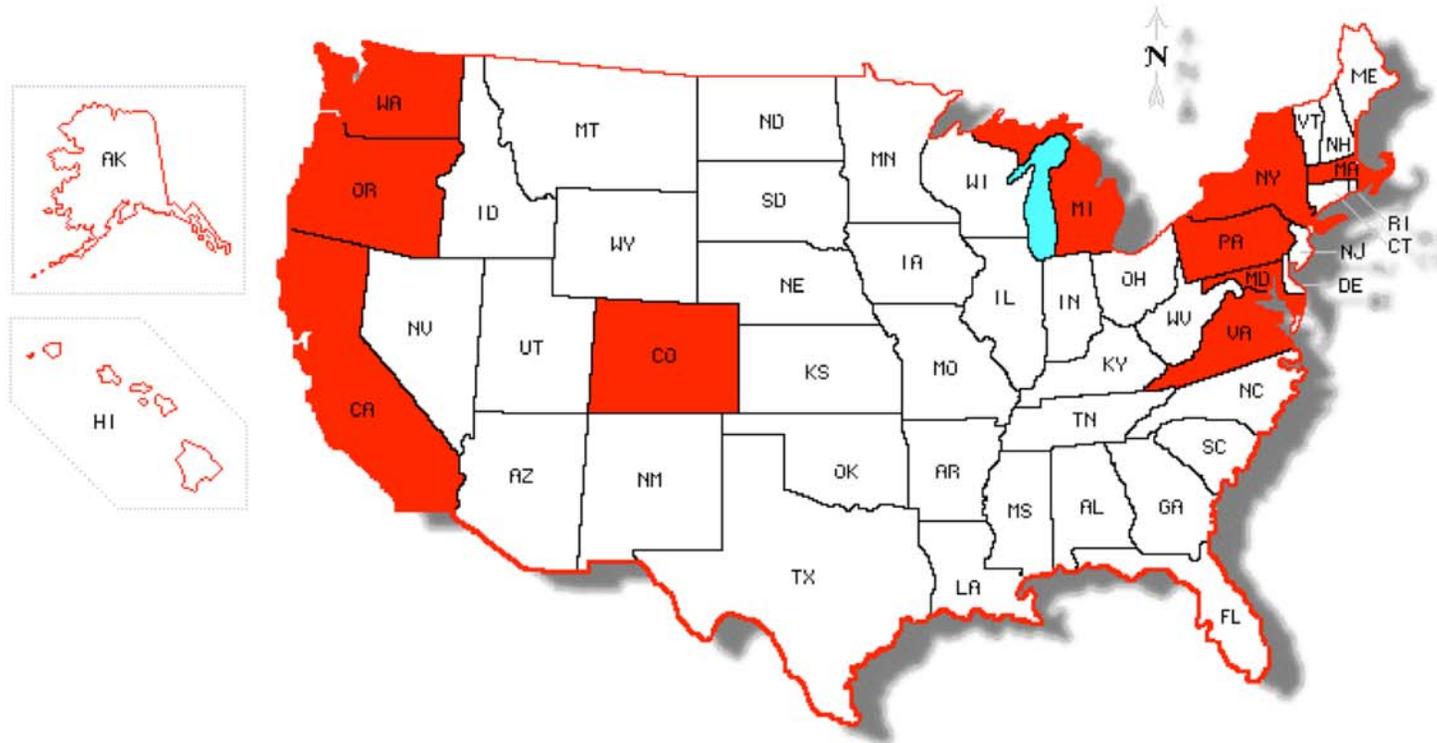
- Stimulating local demand for RE/EE products/services through incentives and Improving infrastructure
- **Strengthening leadership, coordination, and marketing strategies**
- **Creating favorable tax and incentive programs**

New Jersey is already a national leader in the first category. The state has a longstanding history of progressive incentives and policies designed to spur demand for clean energy sources and products through efforts such as the Clean Energy Program, participation in the Regional Greenhouse Gas Initiative, and numerous land use and other policies established by the state Department of Environmental Protection. In 2007, the state passed the Global Warming Response Act, which includes goals for curbing Greenhouse Gas Emissions and in 2008, the Energy Master Plan established additional goals and programs to stimulate demand for clean energy, including significant plans to improve energy generation and transmission infrastructure.

Given the state's extensive work to improve overall energy policy, the review of state best practices that follows will focus on the remaining two strategies.

Attracting High-Wage Clean Energy Jobs

Promising Practices Reviewed in 10 Comparison States



12-23-09

Attracting High-Wage Clean Energy Jobs

Overview of Promising Practices

Promising practices identified in comparison states for attracting exportable green jobs fall into several categories, each of which are reviewed in this section. These include:

- **Strengthening leadership, coordination, and marketing strategies**
 - State-level offices coordinate and market business incentives
 - Coordinated funding strategies
 - Foreign trade delegations
 - Recruitment partnerships

- **Creating favorable tax and incentive programs**
 - Business attraction funding for RE/EE manufacturers
 - R&D and tech transfer programs for clean technology
 - Comparison of state usage of Societal Benefits Charge funds and distribution of production incentives

Note: This research was conducted in Fall 2009. Some tax and incentive programs may no longer exist or may have incurred budget reductions due to state budget crises precipitated by the current national economic recession.

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

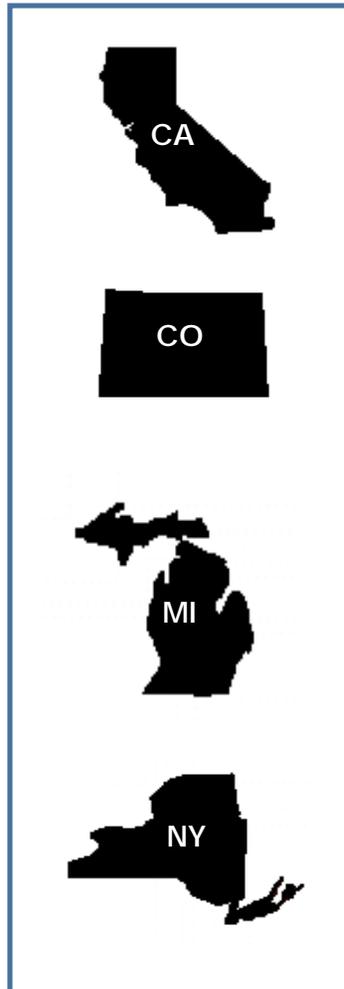
Promising Practice: State-Level Offices to Coordinate & Market Clean Energy Manufacturing and R&D Incentives

A number of states have created or strengthened state-level offices to coordinate the efforts of multiple state agencies and local government agencies to attract exportable jobs.



What is happening in New Jersey?

Multiple government agencies manage incentives that could benefit employers. Alignment of goals and target sectors has been achieved, but employer access to all programs can be improved.



- **California** established the California Alternative Energy and Advanced Transportation Financing Authority to coordinate financing incentives for R&D and manufacturers in target industries.

- **Colorado** created the Governor's Energy Office, and focused the Office of Economic Development and International Trade on the green tech industry.

- **Michigan** created the Department of Energy, Labor, and Economic Growth to align all activities related to renewable energy and energy efficiency.

- **New York** has the New York State Energy Research and Development Agency, an existing agency that has been strengthened to coordinate R&D, workforce, and economic development efforts related to energy.

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

State-Level Energy Economic Development Offices



Multiple Programs Across State Agencies and Departments

New Jersey has a general business portal website and the New Jersey Economic Development Authority manages the state's key business attraction tools, including several targeted at clean energy firms, but the state does not have a designated office to coordinate and market all of its programs and attributes that would make it an ideal location for clean energy businesses. Rather, programs are distributed across multiple agencies and departments. A large number of energy-related programs are housed at The New Jersey Board of Public Utilities (BPU), which manages the state's Societal Benefits Charge (SBC) funds. SBC funds the state's **Clean Energy Program**, which includes numerous incentives for consumers and businesses that encourage the adoption of clean energy programs. These programs are key features of the state's clean energy business attraction portfolio, but are currently marketed primarily as consumer benefits.

NJEDA has taken steps to coordinate its programs with a select number of BPU programs, such as the **Renewable Energy Manufacturing Incentive (REMI) program**, which provides rebates to consumers and businesses that purchase solar panels and related equipment made in the state. However, more could be done to make Clean Energy employers aware of the full suite of policies and programs available at BPU; the Department of Environmental Protection, which manages transportation and biofuels-related programs; the New Jersey Department of Labor and Workforce Development and others.

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

State-Level Energy Economic Development Offices



California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA)

CAEATFA, a division of the California Treasurer's office, offers financing for projects that produce alternative energy sources, as well as for manufacturing and R&D firms that support the development of new alternative energy products and alternative fuels. The Authority provides a portal for these businesses to access information and incentives to get projects started.

The Authority coordinates with **TeamCalifornia**, a nonprofit partnership of public and private stakeholders dedicated to growing California's economy, and **California Business Investment Services**, the state's economic development agency. TeamCalifornia provides web-based access to a range of site location information and information on incentives, including those offered through CAEATFA, as well as those specific to the solar industry. California Business Investment Services provides access to the range of business incentives available across industries in the state.

For more information on CAEATFA, see: <http://www.treasurer.ca.gov/caeatfa/>

For more information on TeamCalifornia, see: http://www.teamca.org/resource_center.php

For more information on California Business Investment Services, see: <http://www.labor.ca.gov/calBIS/>

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

State-Level Energy Economic Development Offices

CO

Governor's Energy Office (GEO)

In 2007, Governor Bill Ritter, Jr. of Colorado issued an Executive Order establishing the Governor's Energy Office to advance energy efficiency and renewable, clean energy resources and to coordinate economic development in the EE and RE areas. The primary mission of the GEO, a strengthened version of an earlier office dedicated to EE and conservation, is to foster the development of EE and RE markets in the state and to promote the state's energy policies to the public.

The GEO also acts as a clearinghouse for marketing business financing mechanisms for manufacturing and R&D firms in the clean technology sector. The GEO website includes a page that details funding opportunities for RE and EE firms and related businesses, as well as a page dedicated to RE and EE tax incentives for consumers and businesses.

For more information on GEO, see: <http://www.colorado.gov/energy/>

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

State-Level Energy Economic Development Offices



Michigan Department of Energy, Labor, and Economic Growth (DeLEG)

Michigan's DeLEG was developed in 2006 as a result of state legislation to align all activities related to renewable energy and energy efficiency. The DeLEG incorporates aspects of the state's Department of Agriculture relating to biofuels, biogas, and biomass; the Department of Environmental Quality relating to energy policy, efficiency alternative energy, green programs, and practices; the Michigan Public Service Commission; and economic development activities related to energy.

Coordinated with DeLEG, Michigan also created **NextEnergy**, a 501(c)3 nonprofit organization, to position the state as a world leader in the research, development, commercialization, and manufacture of alternative-energy technologies. The organization serves as a clearinghouse for R&D and manufacturing companies to locate assistance and resources.

For more information on DeLEG, see: <http://www.michigan.gov/dleg>

For more information on NextEnergy, see: <http://www.nextenergy.org/index.aspx>

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

State-Level Energy Economic Development Offices



New York State Energy Research and Development Authority (NYSERDA)

NYSERDA was created in 1975 to administer the public Systems Benefits Charge funds collected through the state's utilities. According to its website, "NYSERDA strives to facilitate change through the widespread development and use of innovative technologies to improve the State's energy, economic, and environmental wellbeing."

NYSERDA's governing board includes representation from the private sector, as well as public agencies, including the Department of Transportation, the Department of Environmental Conservation, the Public Service Commission, and the Power Authority of the State of New York. NYSERDA provides R&D grants for clean technology businesses and also links and coordinates with other state agencies focused on attracting exportable jobs, including the Empire State Development Corporation; the New York State Foundation for Science, Technology, and Innovation (NYSTAR); and others.

For more information on NYSERDA, see: <http://www.nyserda.org/default.asp>

For more information on the Empire State Development Corporation, see: www.empire.state.ny.us

For more information on NYSTAR, see: <http://www.nystar.state.ny.us/>

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

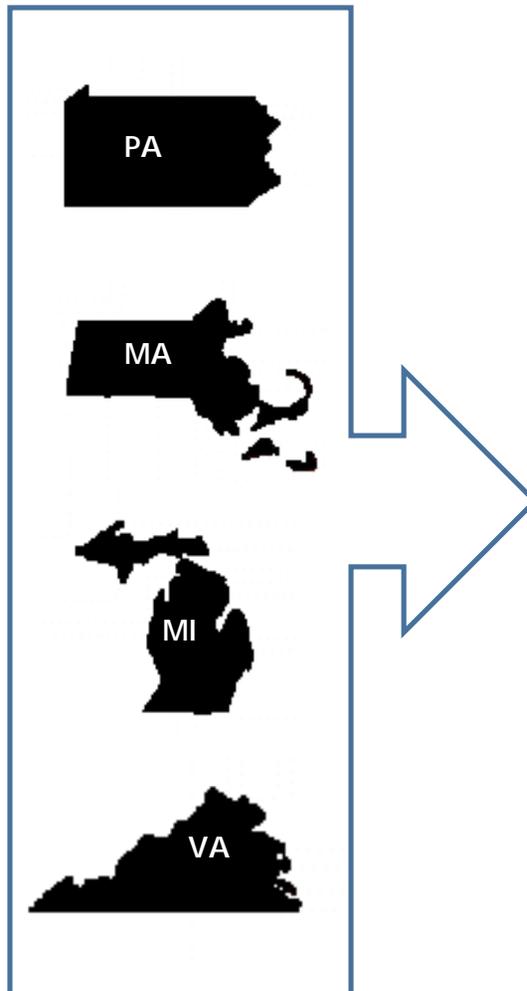
Promising Practice: Coordinated Funding Strategies

A number of states have created consolidated funding strategies and legislation to support clean energy-related economic development.



What is happening in New Jersey?

New Jersey's green jobs initiative stressed the development of EE programs and training to stimulate local demand for EE and RE.



- **Pennsylvania** created the Alternative Energy Investment Fund to provide over \$650 million for multiple clean energy projects, including economic development.

- **Massachusetts** created the \$68 million Alternative and Clean Energy Investment Trust to support multiple R&D, economic development, and workforce projects.

- **Michigan** funded its 21st Century Jobs Fund with \$75 million to provide workforce and economic development programs in clean energy industries.

- **Virginia** – Governor Tim Kaine spearheaded the Renew Virginia initiative to provide funding for multiple job attraction and other clean energy efforts.

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

Coordinated Funding Strategies



The Energy Master Plan Supported by Multiple Funding Streams

New Jersey has dedicated significant funding to support programs that aid in attracting clean energy businesses. However, much of this funding has been allocated piecemeal through a variety of funding streams. While the New Jersey Energy Master Plan calls for significant investments through 2015, no consolidated funding mechanism exists to support key programs. Rather, programs are supported through multiple programs and funding streams. For example, the Board of Public Utilities approved over \$250 million in energy efficiency investments for four of the state's major utilities, while the New Jersey Department of Labor and Workforce Development supported green job training programs. NJEDA and the New Jersey Department of Environmental Protection also maintain key programs and funding pools for clean energy initiatives.

The lack of a coordinated funding mechanism is not necessarily a detriment to New Jersey, however, as such programs often serve the purpose of marketing the state's intent to support key programs. The Energy Master Plan and the Global Warming Solutions Act Recommendations report help to serve that function in New Jersey and other steps can be taken to communicate the extent and type of financial support the state provides to key clean energy initiatives.

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

Coordinated Funding Strategies



Pennsylvania Alternative Energy Investment Fund

Signed into law as part of Special Session Act 1 of 2008, Pennsylvania's Alternative Energy Investment Fund provides funding for multiple programs — from business attraction and incubator programs, to those designed to stimulate demand for RE and EE programs and products. Key funded programs include:

- \$270 million in direct funding to large companies
- \$40 million for incubation programs
- \$220 million to consumers and small businesses, and \$50 million in tax credits
- \$40 million for low-income EE programs
- \$25 million for pollution control technology, and \$5 million for energy efficiency loans
- \$80 million program for economic development in the solar sector

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

Coordinated Funding Strategies



Massachusetts Alternative and Clean Energy Investment Trust

The Massachusetts Green Jobs Act of 2008 combined the state's Renewable Energy Trust (RET), a fund to promote the supply and use of clean energy in the state, with the Massachusetts Clean Energy Center, which funds research and workforce and economic development related to clean energy. The new Clean Energy Center is now funded through the Massachusetts Alternative and Clean Energy Investment Trust Fund, which provides \$68 million in funding over five years. The Fund includes the following key programs:

- \$5 million in RET funding for 2009
- \$1 million each for seed grants to companies, universities, and nonprofits
- Workforce development grants to state higher education, vocational schools, and nonprofits; and low-income job training (Pathways out of Poverty)
- \$100,000 for a study of the clean energy sector

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts
Coordinated Funding Strategies



Michigan 21st Century Jobs Fund

The 21st Century Jobs Fund supports basic and applied research, technology transfer, and the commercialization of products, processes and services. The fund is focused on the following industries: bioenergy, wind generation-wind energy, advanced energy storage-advanced batteries, solar cells-solar energy, and hydro-electricity. While allocations are still under way, key funded programs include:

- \$1.4 million for Michigan Small Business and Technology Centers, a business incubator program that provides grants and loans to competitive-edge technology businesses located in economically depressed areas (allocation may increase up to \$4 million, if approved)
- \$100 placeholder for a bioscience research center at Michigan State University, to be increased as the state budget allows

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

Coordinated Funding Strategies



Renew Virginia Initiative

Governor Tim Kaine helped to pass several bills that comprise *Renew Virginia*, a stimulus initiative designed to create jobs and promote clean energy. The initiative includes a strong focus on economic development, and includes the following key programs:

- \$2 million for a clean energy manufacturing incentive that promotes the manufacture of components for multiple low and no-carbon energy sources
- A biofuels incentive grant that is designed to stimulate the manufacture of non-food source biofuels
- The initiative also funds EE and RE projects, as well as marketing and recruitment activities to promote clean energy manufacturing and R&D in the state

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

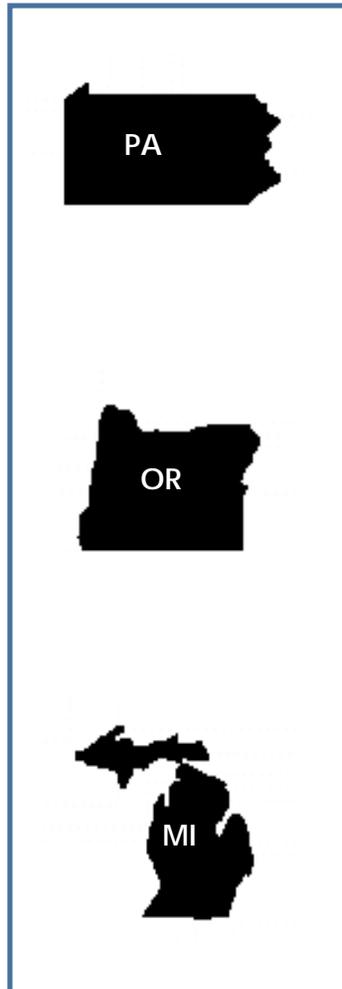
Promising Practice: Foreign Trade Delegations for Target Industries

Governors from several states have made intensive efforts to market their states to foreign-owned alternative energy companies as a means to raise awareness of their states in the global clean energy marketplace.



What is happening in New Jersey?

Governor Corzine made trade missions to multiple countries, but more can be done to target these missions to key clean energy industries and firms.



- **Pennsylvania** - Governor Rendell made numerous visits to Europe to recruit wind, biofuel, and solar energy companies.

- **Oregon** - Governor Kulongoski focused on Asia to recruit electric battery makers and other renewable energy companies.

- **Michigan** focused recruitment efforts on Asian and European Lithium-Ion Battery companies and automotive supply manufacturers that create alternative energy products.

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

Foreign Trade Delegations



Efforts to Attract Foreign-Owned Clean Energy Firms

New Jersey recently hosted delegates from Taiwan clean energy businesses interested in partnering with New Jersey companies. Held in December 2009, the forum featured solar photovoltaics firms and R&D organizations from Taiwan seeking technology transfer-based partnerships, as well as other business opportunities.

No evidence was found that New Jersey has instituted a targeted campaign to engage in foreign trade missions designed to recruit clean energy firms to the state to the extent that such missions have been organized in other states.

Given the dominance of Asia and the European Union in market share for clean energy manufacturing and, to a somewhat lesser extent, R&D, New Jersey may be missing key opportunities to market its unique strengths for supporting clean energy industry clusters.

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

Foreign Trade Delegations



Pennsylvania: A Focus on Europe

In 2006, Governor Rendell made multiple visits to Europe to recruit wind, biofuel, and solar energy companies, including attending the Wind Energy conference in Germany. The Governor's clean energy agenda was showcased at the United Nations in New York, and as part of former President Bill Clinton's inaugural meeting of the Clinton Global Initiative. Gamesa, one of the world's largest wind turbine manufacturers built its facility on the site of a former steel manufacturing plant and, though suffering recent setbacks, has reemployed some of these workers.

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

Foreign Trade Delegations



Oregon: Batteries and Renewables from Europe and Asia

Governor Kulongoski has made numerous visits to Asia to recruit electric battery makers (now entering the auto manufacturing market) in China and auto manufacturers in Japan. Recent acquisitions include ReVolt Technology, a Swiss battery manufacturer that will establish its headquarters, including an R&D center and a manufacturing plant, in Portland, creating over 250 jobs.

With a focus on marketing the state's available semiconductor workforce, Oregon also recruited Solar World (a German company) on the heels of the company scaling back operations in California and Washington. Other state incentives includes \$40 million in business tax credits, but the CEO states that the available workforce and training programs were an important factor in the decision to locate manufacturing operations in Oregon. Several other solar manufacturers are following on the heels of Solar World as well.

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

Foreign Trade Delegations



Michigan: A Broad-Based Approach

Governor Granholm has made numerous trade missions to Israel, Japan, Sweden and Germany in recent years to build on the state's automotive and battery industry base, including a new focus on alternative energy technologies.

Four foreign energy storage companies recently announced nearly \$1.7 billion in investments in the state, assisted by an estimated \$543.5 million in tax breaks. The new investments in Michigan are expected to create 6,600 jobs. Other key partnerships include Chemrec AB, a Swedish alternative energy company, as well as numerous German companies, including Eberspächer and ZF Lemforder, which develop automotive products such as alternative storage devices and other clean energy products.

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

Recruitment Partnerships

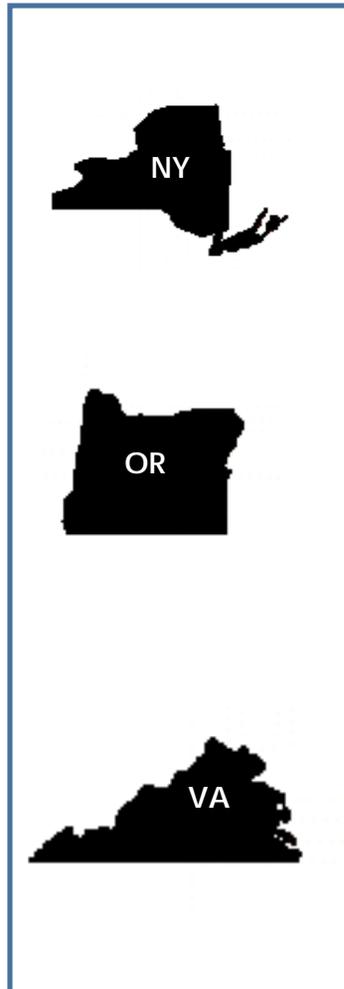
Promising Practice: Recruitment Partnerships with Business, Universities, and State Government

Several states are leveraging existing employers and universities to recruit new firms.



What is happening in New Jersey?

New Jersey is creating the Energy Institute, an effort to coordinate and support energy research efforts, to expand partnerships with businesses, and to spur innovation.



New York - The industry-led Solar Technology Consortium uses partnerships to recruit solar manufacturing and R&D firms.

Oregon - The Governor's Alternative Fuel Vehicle Infrastructure Working Group was created to write policy and create the infrastructure needed to lure targeted companies.

Virginia - The Governor's Renew Virginia initiative created the Interagency Task Force for Energy Project Recruitment to recruit clean energy businesses.

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

Recruitment Partnerships



The Energy Institute of New Jersey and Other Efforts

In 2009, the New Jersey Governor's Office began the implementation of an Energy Institute that was designed to leverage and coordinate existing clean energy R&D resources in the state. The Institute, which is still in the planning stages, would serve to identify current basic and applied clean energy R&D and to allow for the development of coordinated funding proposals, demonstration projects, and other joint efforts. Members would include key science and technology departments, such as the Commission on Science and Technology, businesses, and research universities.

Such an institute could serve to promote clean energy R&D cluster development by enhancing the state's R&D activities in clean energy and by making R&D facilities, knowledge resources, skilled workers, and other innovation-enhancing assets more readily available to businesses that need them.

A new goal for the Energy Institute could be to coordinate with EDA officials to establish trade delegations that consist of business development officials and R&D experts who can market the state's clean energy R&D infrastructure more effectively.

A key recommendation of the Global Warming Response Act Recommendations Report, 2009 was to form an **Alternative Vehicles Working Group** to assess the need for infrastructure change.

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

Recruitment Partnerships



The Solar Energy Consortium (TSEC)

The Solar Energy Consortium was designed to promote innovation in solar energy products, systems, and services through research & development support, demonstration projects and other activities, as well as to disseminate new knowledge to a broad array of partners. Another key mission of TSEC is to partner with state, regional, county, and local governments and economic development organizations, state universities, and business partners to attract and promote the growth of solar energy-related companies in New York.

TSEC includes 70 business partners throughout the state, as well as researchers from six major universities (Binghamton University, Cornell University, Rensselaer Polytechnic Institute, Clarkson University, SUNY-New Paltz, and CUNY). Partners throughout the state collaborate on solar products and technologies identified by an array of engineers, integrators, installers and application specialists as having market potential, and work together to promote the value of the state and the region as a hub for solar manufacturing and research.

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

Recruitment Partnerships



The Governor's Alternative Fuel Vehicle Infrastructure Working Group

Oregon Governor Ted Kulongoski signed an executive order in 2008 to create a working group that will build plans to work effectively with private-sector employers to ensure that the state is able to establish the infrastructure needed to develop alternative fuel stations in Oregon by October 2010. The group will also serve a public information purpose and allow residents to debate the benefits and costs of undertaking new alternative fuel projects in local communities. Governor Kulongoski noted, "As the private marketplace transitions to new technologies, it is critical that the state, local partners, and private companies work together to build a consistent and reliable refueling infrastructure so consumers can make the switch to new, greener vehicles." Oregon has created agreements with Toyota, Nissan, and Mitsubishi to test new facilities for their plug-in hybrid and electric vehicles. (Source: http://governor.oregon.gov/Gov/P2008/press_092608.shtml)

The Governor appointed 12 members with expertise in alternative fuel vehicles and infrastructure. These members represent the transportation and utility industries, state and local government, the business community, the energy efficiency and conservation community, as well as members of the general public.

Attracting High-Wage Clean Energy Jobs

Strengthening Leadership, Coordination, and Marketing Efforts

Recruitment Partnerships



Virginia Interagency Task Force for Energy Project Recruitment

As part of his Renew Virginia Initiative, Governor Kaine placed the Virginia Economic Development Partnership (VEDP) in charge of creating an energy marketing plan with businesses and universities to attract additional clean energy businesses to the state. The group includes several large energy employers and university partners. The VEDP released an initial plan in July 2009 that included the following key action items:

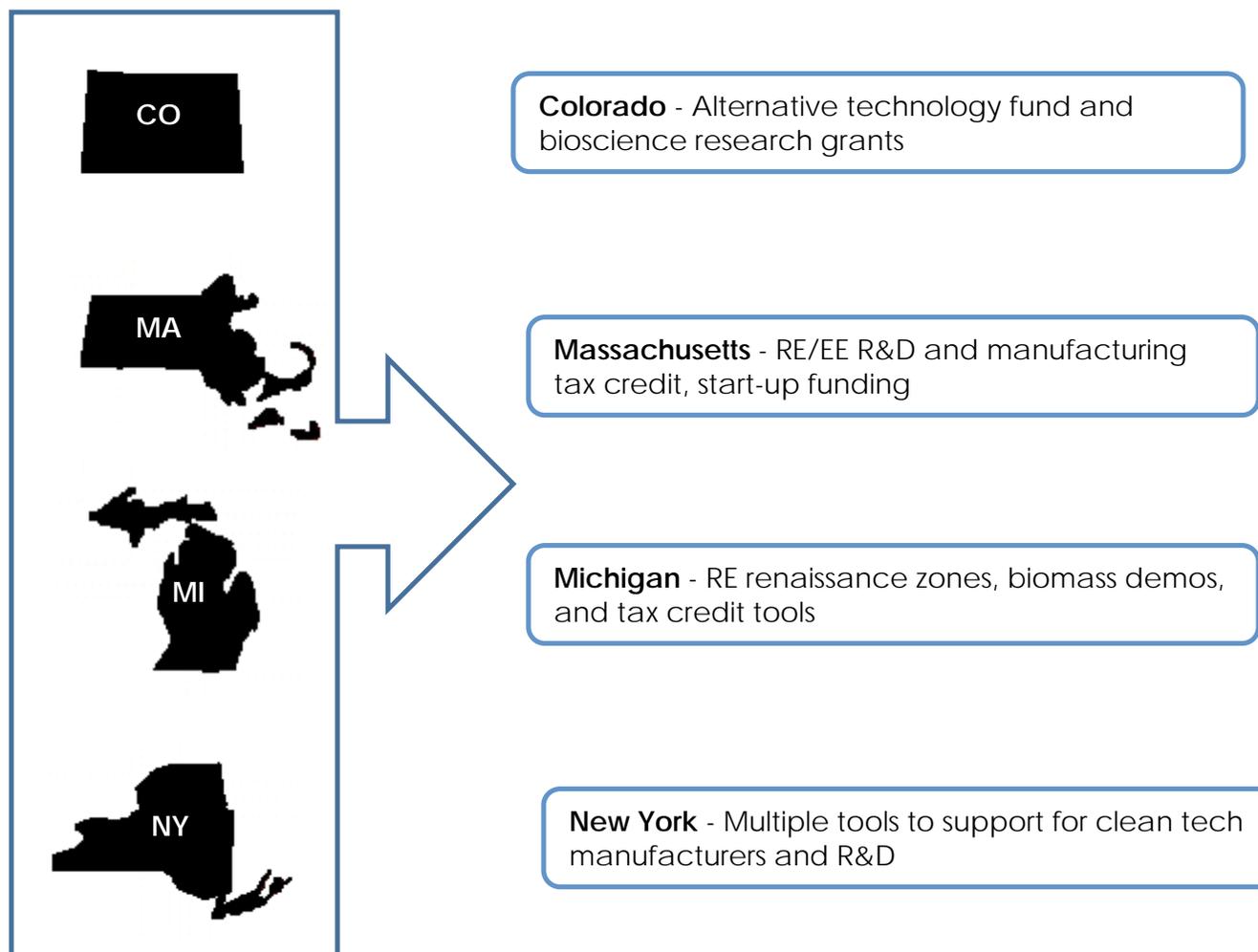
- Create an energy marketing team
- Align energy workforce development systems
- Expand relationships with R&D centers
- Expand relationships with energy venture capitalists
- Leverage ARRA projects for business recruitment
- Create a newsletter and brochure for industry targets and partners
- Convene a governor's clean energy symposium

Attracting High-Wage Clean Energy Jobs

Creating Favorable Tax and Incentive Programs

Promising Practice: Tax and Incentive Programs for RE/EE Manufacturers and Research & Development

States have established a variety of tools to provide financial incentives and tax benefits to clean technology firms.



Attracting High-Wage Clean Energy Jobs

Creating Favorable Tax and Incentive Programs

Promising Practice: Tax and Incentive Programs for RE/EE Manufacturers and Research & Development (cont.)



What is happening in New Jersey?

The New Jersey Economic Development Authority administers the Clean Energy Manufacturing Fund, which provides \$12 million per year in grants to manufacturers of EE or RE equipment. NJEDA also manages the Edison Innovation Fund, which provides seed funding for early-stage technology companies, and an incubator program to support R&D in high-tech industries, including clean energy. The EDA also administers numerous general tax and recruitment incentives that could be better marketed to clean energy firms. The Board of Public Utilities administers energy generation, biomass, and direct-to-consumer incentives.



Pennsylvania - Bond financing for clean energy manufacturing and R&D and alternative fuel investment fund



Virginia - Clean energy manufacturing incentive program



Washington - Tax abatements for solar manufacturers

Attracting High-Wage Clean Energy Jobs

Creating Favorable Tax and Incentive Programs



The Edison Innovation Programs and Other Business Attraction Tools

The New Jersey Economic Development Authority administers the **The Edison Innovation Clean Energy Manufacturing Fund**, which provides \$12 million per year in grants up to \$3.3 million each, to manufacturers of EE or RE equipment. The Fund is coordinated with New Jersey's **Renewable Energy Manufacturing Incentive (REMI) program**, administered by the Board of Public Utilities, which provides rebates to those who purchase solar panels and associated equipment manufactured in New Jersey.

NJEDA also administers numerous general tax and recruitment incentives that could be better marketed to clean energy firms. The Board of Public Utilities administers energy generation, biomass, and direct-to-consumer incentives.

Attracting High-Wage Clean Energy Jobs

Creating Favorable Tax and Incentive Programs

CO

Alternative Technology Fund and Bioscience Research Grants

Colorado's Advanced Technology Fund is managed by the Colorado Department of Public Health and Environment. The program funds research on recycling techniques and technology, preferably at Colorado universities. A key program within the fund is the New Economy Economic Development grant program, which funds early-stage companies to develop and market green technologies. The Advanced Technology Fund is supported through \$7 million to \$10 million each year from the state's gaming receipts.

The state also maintains a Bioscience Discovery Evaluation Grant Program. The program, which is administered by the Colorado Office of Economic Development, supports biofuels research projects at research institutions.

Attracting High-Wage Clean Energy Jobs

Creating Favorable Tax and Incentive Programs



RE/EE R&D and Manufacturing Tax Credit, Start-up Funding

Massachusetts allows firms to take a corporate excise tax deduction for the income resulting from the sale or lease of a U.S. patent that advances energy efficiency or renewable energy development or from the sale of RE and EE materials manufactured in the state resulting from the patent. The deduction is effective for up to five years.

The Sustainable Energy Economic Development (SEED) Initiative is a program funded by the state's Renewable Energy Trust that provides financial assistance for early-stage renewable energy companies. The program is targeted to companies that have promising technologies but no current backing from venture capitalists. The program provides convertible loans up to \$500,000 each.

Massachusetts also provides a tax incentive for research & development investment for both manufacturers and R&D companies. This tax incentive was designed to overcome funding gaps for research and to spur technology transfer. The program is patterned on the federal tax credit program.

Attracting High-Wage Clean Energy Jobs

Creating Favorable Tax and Incentive Programs



RE Renaissance Zones, Biomass Demos, and Tax Credit Tools

Michigan's Renewable Energy Renaissance Zones (RERZs) were created in 2006. The program is a component of the state's Renaissance Zone program, which provides tax benefits to firms in their boundaries. Firms are exempt from the Michigan Business Tax, state education tax, personal and real property taxes, or local income taxes. These taxes can be abated for up to 15 years, with the abatements being phased out gradually over three years. The NextEnergy Zone is a designated RERZ designed to promote industry cluster development. Located at Wayne State University Research and Technology Park, the zone houses the NextEnergy Center. The center has laboratory facilities, business incubator space, collaborative meeting space, and other facilities to support Michigan's alternative energy industry.

The Biomass Energy Program Grants funds biofuel and bioenergy education, biofuels infrastructure, and biomass technology development and demonstrations, thus facilitating technology transfer.

Michigan also provides numerous tax credits for clean energy companies including:

- Refundable R&D Tax Credit
- Nonrefundable Business Activity Tax Credit
- Refundable Hybrid Technology R&D Credit
- High-Technology Anchor Company Payroll and Property Tax Credits
- Miscellaneous Energy-Related Credits for Manufacturers (batteries, etc.)
- Refundable Payroll Tax Credit

Attracting High-Wage Clean Energy Jobs

Creating Favorable Tax and Incentive Programs



Multiple Tools to Support for Clean-Tech Manufacturers and R&D

New York has created the Renewable, Clean Energy, and Energy Efficient Product Manufacturing Incentive Program to encourage the growth of clean energy product clusters in the state. The program is funded for \$10 million per year and grants total up to \$1.5 million per project. An employer match of 50% is required for the first two phases of the project, with a 75% match required in the third phase.

The New York State Energy Research and Development Authority (NYSERDA) also maintains the Clean Energy Business Growth and Development Program. The program provides grants up to \$200,000 with a 50% employer match to assist companies to launch new products and services, accelerate sales, finance new business ventures, and develop new business infrastructure and relationships. The program is supported through the state's System Benefits Charge (SBC), with \$6.4 million available for a total of five rounds of funding,

To support R&D and further promote cluster development, NYSERDA provided \$1.5 million to the State University of New York (SUNY) Buffalo to fund a clean energy business incubator. NYSERDA also manages the Saratoga Technology and Energy Park (STEP) program, which provides tax incentives for RE/EE office operations, lab facilities, and light manufacturing firms that locate in the park.

NYSERDA also issued a \$10.5 million state grant to secure \$100 million federal funding for five Energy Frontier Research Centers. Additionally, Empire State Development manages the Environmental Investment Program, which funds demonstration projects for recycling products.

Attracting High-Wage Clean Energy Jobs

Creating Favorable Tax and Incentive Programs



PA

Bond Financing and Solar Manufacturing Business Loans

Pennsylvania lawmakers dedicated \$500 million of the state's consolidated \$650 million Alternative Energy Investment Fund to provide bond funding to companies that generate, distribute, or store solar energy, or facilities that manufacture or assemble solar panels or other solar equipment. Research & development facilities are also eligible. Financing is provided through the Commonwealth Financing Authority with a 50% employer match. The Departments of Community and Economic Development and Environmental Protection jointly administer the program under the direction of the Commonwealth Financing Authority.

The state also provides \$16 million for the Alternative Fuels Investment Fund. This fund supports companies that manufacture solar components for renewable energy generation equipment. Loans of up to \$35,000 for every new job projected to be created within three years are available. Guarantees of up to \$5 million are also available.

Attracting High-Wage Clean Energy Jobs

Creating Favorable Tax and Incentive Programs



Clean Energy Manufacturing Initiative

Virginia's Solar Manufacturing Incentive Grant (SMIG) Program, established in 2005, was recently expanded to become the Clean Energy Manufacturing Initiative, covering a wider range of RE and EE technologies. The program is unique in tying incentives to product sales to reward the company's actual contribution to the state economy. The program offers up to \$4.5 million per year to qualified firms. The incentive is paid at a rate of up to \$0.75 per watt for panels sold in a calendar year, with a maximum of 6 MW. Grants are available up to six years.

Attracting High-Wage Clean Energy Jobs

Creating Favorable Tax and Incentive Programs



Tax Abatement for Solar Manufacturers

Washington provides tax abatements to solar manufacturers. The firms pay 40% lower than the standard manufacturing business and occupation tax rate of 0.484%. Signed into law by Washington's governor in May 2005, the program was created to reduced the tax rate for Washington manufacturers and wholesale marketers of solar-electric (photovoltaic) modules or silicon components of those systems.

Attracting High-Wage Clean Energy Jobs

Use of Public Benefit Charge Funds

A Public Benefits Charge is added to utility bills to pay for various clean energy programs in six of the ten competitor states profiled. Two of the six competitor states with Public Benefits Charges in place use them to **fund R&D activities**, as well as EE, RE, and low-income EE assistance. New Jersey's Societal Benefits Charge currently funds the state's clean energy Programs, but not R&D.

	EE	Low-Income Assistance	RE	R&D
California	X		X	X
Massachussetts	X	X		
Michigan	X	X	X	
New Jersey	X	X	X	
New York	X	X	X	X
Pennsylvania	X		X	
Oregon	X	X	X	

States without a statewide Public Benefits Charge

- Colorado (local only)
- Maryland
- Washington
- Virginia

Additionally, the program in Pennsylvania will be phased out in 2010.

Attracting High-Wage Clean Energy Jobs Renewable Energy Production Incentives

New Jersey is the only state to have more than one statewide production incentive for RE.

	None Identified	Feed-In Tarriff	Renewable Energy Credits	Fixed Rate Buy-Back
California		X		
Colorado	X			
Maryland	X			
Massachussetts			X	
Michigan				X
New Jersey			X	X
New York				
Oregon		X		
Pennsylvania	X			
Washington				X

Source: U.S. Department of Energy, DSIRE database: Production Incentives

New Jersey offers both Renewable Energy Solar Credits and a fixed-rate energy purchase arrangement, whereas most competitor states offer either nothing, according to the USDOE's database of EE/RE incentives, or only one of the three types of incentives.

Attracting High-Wage Clean Energy Jobs

Workforce Preparation

In most states profiled, workforce education and training efforts are primarily geared toward installation and maintenance positions in RE/EE, such as energy auditing and solar panel installation.

However, a recent study* revealed that a number of states are increasingly taking steps to align higher education practices with industry workforce needs.



Washington, for example, has implemented the following:

- **Skills Councils** are held statewide in various industries to assess skill needs
- The state passed a law to ensure that higher education institutions **use data on employment and interaction** with the workforce system to determine the number of degree slots to make available.
- Centers of Excellence at 34 colleges and universities addressing various sectors.
- A “report card” to measure success of key efforts to address industry workforce needs through higher education programs

These policies offer examples of key ways to ensure that target clean energy industries have access to skilled workers.

** Source: Maria Heidkamp, Aaron Fichtner, and Carl Van Horn, “Harnessing the Power of Higher Education: Promising State Strategies to Meet the Talent Needs of a Knowledge-Based Economy.” New Brunswick, NJ: John J. Heldrich Center for Workforce Development. Report produced for the National Governors Association.*

Attracting High-Wage Clean Energy Jobs

Conclusions

- New Jersey has a robust set of energy policies and incentives to build demand for RE/EE products, a key driver of job growth for manufacturing, R&D, and corporate jobs.
- The state also has a strong suite of economic development tools, including several targeted toward clean energy employers.
- To compete effectively for clean energy manufacturing, R&D, and corporate headquarters jobs, New Jersey must strengthen the coordination and marketing of existing incentives and policy tools.
- Other states provide examples of strategies that will help New Jersey improve in two key areas, including:
 - Leveraging, marketing and communicating the state's full array of programs and benefits to potential employers in targeted clean energy sectors
 - Creating coordinated public-private partnerships across multiple agencies and departments
 - Designing targeted strategies to attract firms in key sectors, including foreign trade delegations

About the Study

This study of promising strategies in clean energy technology business attraction was funded by the New Jersey Office of Economic Growth. The John J. Heldrich Center for Workforce Development would like to thank Jerry Zarro, former Executive Director of the Governor's Office of Economic Growth for his support of this project. Maureen Hassett, Senior Vice President, Governance and Public Information at the New Jersey Economic Development Authority also provided valuable input and assistance for this report.

Jennifer Lenahan-Cleary and Aaron Fichtner, Ph.D. were the key authors of the report. Carl Van Horn, Ph.D., Professor and Director of the Heldrich Center provided guidance and oversight of the project. Research and editorial assistance were provided by Christina Herzog, Qianqi Shen, and Steven Fischer, as well as Robb C. Sewell-Wolff and Jeff Stoller, all staff of the Heldrich Center.

The study involved interviews with numerous clean energy technology policy experts, researchers, employers, and others, including those from New Jersey and other states. Researchers also reviewed websites, documents from other states as well as national and regional clean energy technology reports to identify promising strategies.

The conclusions and recommendations presented here are those of the authors and do not necessarily reflect the views of policymakers or other interviewed for this report.