The Garden State in the Greenhouse

Climate Change Mitigation and Coastal Adaptation Strategies for New Jersey

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Michael Oppenheimer, Professor of Geosciences and International Affairs, Princeton University

Stephen W. Pacala, Professor of Ecology and Evolutionary Biology, Princeton University

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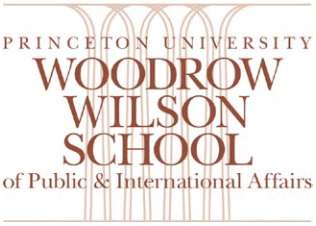

For baby Leala, may we leave her and her generation a world unthreatened by perils we know are today preventable.

Woodrow Wilson School of Public and International Affairs
Princeton University
Robertson Hall
Princeton, NJ 08544-1013
http://www.wws.princeton.edu/

Methodology

This report was researched and written by a group of graduating Masters in Public Affairs and Masters in Public Policy students at the Woodrow Wilson School at Princeton University. Led by two Princeton University instructors—an atmospheric scientist and an urban and regional planner and former Director of the Division of Coastal Resources in the New Jersey Department of Environmental Protection (NJDEP)—the project was sponsored by the School as part of the annual graduate policy workshop program. The goal of the workshop program is for the students to contribute to addressing critical policy problems. This particular workshop arose out of NJDEP's desire to develop a comprehensive climate change strategy for New Jersey. The group set out to address that need and hopes it has succeeded in offering recommendations that will be useful to New Jersey as it confronts the growing challenges of climate change.

In developing the report, the group first met with the director and staff of NJDEP's Office of Policy, Planning and Science to discuss the interests and needs of the client. Over the following weeks, members reviewed the latest science behind global warming and researched 'best practice' mitigation and coastal adaptation policies. The latter included discussions with more than 40 experts and stakeholders, including government agencies, business networks, academics and advocacy groups. The group met with experts in New Jersey, the Northeast, California, the United Kingdom and the Netherlands. They also studied the latest technological advances in clean energy and coastal protection measures through site visits, such as to Princeton University's cogeneration plant and the UK Thames Barrier facility. The authors researched various climate change mitigation and coastal adaptation topics relevant to New Jersey and formed policy task groups to develop specific final policy recommendations that incorporated feedback from outside experts and New Jersey government agency staff. Through careful research and deliberation, the group studied the policies already adopted by the State and decided against suggesting a myriad of specific efficiency and technology strategies that could be adopted to mitigate the effects of climate change. Rather, this report focuses on the state-level actions needed to make New Jersey a climate change leader and, at the same time, create momentum for strong regional- and federal-level action in the near future.

This report can be accessed online at:
http://www.princeton.edu/~mauzeral/teaching/wws591a_report.pdf
http://www.wws.princeton.edu/research/PWReports/F06/wws591a.pdf

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This report was prepared for the New Jersey Department of Environmental Protection (NJDEP) by the Urban & Regional Planning (URP) and Science, Technology & Environmental Policy (STEP) Graduate Student Workshop at Princeton University's Woodrow Wilson School of Public and International Affairs.

The Woodrow Wilson School of Public and International Affairs, founded at Princeton University in 1930, provides an interdisciplinary program that prepares undergraduate and graduate students for careers in public and international affairs. The school is one of the world's premier academic and research institutions devoted to public and international affairs.

The New Jersey Department of Environmental Protection (NJDEP) was founded on America's first official "Earth Day" on April 22, 1970. Since that day, NJDEP has assisted the residents of New Jersey in preserving, sustaining, protecting and enhancing the environment. The organization is a leader in the USA for its pollution prevention efforts and innovative environmental management strategies.

The views expressed in this report are the views of the authors and do not represent the views of Princeton University, the Woodrow Wilson School, New Jersey Department of Environmental Protection, or those who provided advice. Any errors of fact are the responsibility of the authors.

Prepared by:

Jessica Colón, MPA (Master of Public Affairs)-URP Candidate

Patricia M. Fong, MPA-URP and STEP Certificate Candidate

Suzanne Gelderman, MPA-URP and STEP Certificate Candidate

Stephanie Greenwood, MPA-URP Candidate

Elizabeth Sarah Lindsey, MPA-URP Candidate

Marcos A. Marrero Rivera, MPA-URP Candidate

Irene Sanchez, MPA-URP Candidate

Perris Straughter, MPA-URP Candidate

John Virgoe, MPP (Master of Public Policy) and STEP Certificate Candidate

Faculty Advisors:

David N. Kinsey, Visiting Lecturer of Public and International Affairs

Denise L. Mauzerall, Associate Professor of Public and International Affairs

Executive Summary

Climate change poses a significant threat to New Jersey's economic, social and environmental future. In the absence of federal leadership, states must take the lead on reducing greenhouse gas emissions and adapting to the impacts of climate change, including sea level rise and increasingly frequent and damaging storms.

New Jersey has already taken many important steps toward a responsible climate change policy, such as the Governor's recent appointment of a Director of Energy Savings. However, the scale of the problem and its potential consequences for the state mean that more and bolder steps are required to preserve the quality of life in New Jersey now and in the future.

This report outlines a strategy for moving toward an adequate response to climate change while at the same time advancing the State's economic growth. New Jersey should enact innovative strategies that will not only reduce greenhouse gas (GHG) emissions and protect its coastline, but will also bring new industries, technologies and jobs to the state. To accomplish this, the State should take action in six major areas:

1. Establish New Jersey's regional and national leadership on climate change by:

- Announcing and implementing a mandatory 2020 GHG emissions cap and an ambitious 2050 emissions reduction target through an economy-wide cap-and-trade system, enhanced efficiency measures and incorporation of emission reduction goals into State planning, purchasing and other activities;
- Creating a Climate Change Division within the Office of Economic Growth to direct all emissions reduction and adaptation research in collaboration with a high-level inter-agency task force and with input from a stakeholder advisory council; and
- Launching and leading a network of "Cool States" committed to reducing emissions based on legally binding caps and hosting a Trans-Atlantic summit on climate change that would bring together policy-makers, business leaders and clean energy technology innovators from Europe, Canada, and the US to exchange best practices, promote technological advances and showcase investment and business opportunities.

2. Link climate change policies to economic growth and workforce development by:

- Capitalizing on New Jersey's competitive advantages in high-tech businesses to cultivate a clean energy sector through an explicit focus on clean energy businesses at the New Jersey Economic Development Authority (NJEDA) as well as the State's innovation funds and incubators;
- Creating a "green jobs" track within the State's community college vocational training system and working with non-profit organizations and trade unions to link residents in high-unemployment areas to training and placement in green building construction, installation and maintenance of energy-efficient and renewable energy equipment and auto-mechanic services for hybrid and plug-in vehicles; and
- Increasing demand for clean and green jobs through the strategic use of State incentives; and
- Establish a "Green Gold" pilot program in the city of Newark that would lower the energy costs of residents and businesses, support green building standards in new construction, and train and place under- and unemployed workers in green construction, installation and maintenance jobs in the city and regionally.

3. Boost energy efficiency gains through:

- An energy use surcharge balanced by a reduction in corporate payroll tax for state businesses;
- Enhanced incentives for residents to purchase energy-efficient equipment;
- Demand-Side Management to align incentives of energy distributors with efficiency rather than sales; and
- Increased funding (through auctioning 100 percent of Regional Greenhouse Gas Initiative emissions allowances) and improved targeting of funds in the State's Clean Energy Program for cost-effective emissions reduction.

4. Make transportation more efficient and make development smarter by:

- Making reductions in Vehicle Miles Traveled (VMT) an explicit goal of State planning documents and more aggressively promoting transit-oriented planning and development; and
- Promoting alternative fuels and encouraging increased fuel efficiency standards, starting with the State's vehicle fleet and vehicles used by local governments and schools.

5. Improve State preparedness for sea level rise and increased frequency & intensity of storms by:

- Producing vulnerability assessments and cost-benefit reports evaluating the impact of climate change on the coasts and incorporating the findings into NJDEP rules and State and local planning, land use and public investment decisions;
- Ensuring that emergency management plans account for projections about rising sea levels and storms;
- Enhancing pre-storm planning for post-storm management, including strategic land preservation and guidelines for whether, where and how to rebuild following storm damage; and
- Partnering with the insurance industry to shield coastal residents from catastrophic losses.

6. Increase Public Awareness about Climate Change Impacts and Support for State Action by:

- Creating a statewide awareness campaign that includes a user-friendly website and advertisements in print and broadcast media; and
- Taking immediate steps to ensure that education about climate change in New Jersey's public schools is continued and expanded.

Introduction

New Jersey has the opportunity to turn the most serious environmental problem of our time – climate change – into a key component of its economic growth strategy. But in order to avoid the worst costs and capitalize on the opportunities presented by climate change, the State must take bold, immediate action. This report for the New Jersey Department of Environmental Protection (NJDEP) recommends ways to reduce New Jersey's greenhouse gas (GHG) emissions and adapt to the impacts of climate change along the coast, while at the same time growing the economy through "green" job creation, technology innovation, energy savings and avoided future costs.

Scientists agree that climate change due to GHG emissions is likely to impose significant changes on the planet within the next fifty years. New Jersey, as a low-lying coastal state, faces the prospect of losing up to 9 percent of its land area, including Atlantic City and the cherished Jersey Shore, to sea level rise and episodic flooding by 2100.[a] Leading economists recently produced a report for the government of the United Kingdom assessing the costs of climate change at up to 20 percent of global gross domestic product (GDP) if left unchallenged.[b] So while tackling the problem of climate change seems daunting, it is becoming increasingly clear that decisive action now will avoid formidable future costs.

Strong leadership on climate change can also produce important economic advantages, driving job growth and business development toward a future based on clean, efficient and renewable energy use that promotes a high quality of life for state residents. While New Jersey's extreme development pressures, heavy automobile use and energy demands all present challenges to reducing emissions and adapting to sea level rise, the state can offset these difficulties by capitalizing on its infrastructure and industrial strengths and cultivating strong local demand for clean energy technology products and services.

At a time when the Federal Government justifies its lack of action on climate change in the name of safeguarding economic growth, New Jersey's success in combining environmental and economic objectives can provide a model for the nation. States across the country are beginning to recognize the imminent dangers and the economic opportunities posed by climate change and are taking actions to address both. Governor Corzine can make New Jersey a leader in this effort, drawing on the state's technological advantages to harness the economic potential of emission reduction requirements, demonstrating both the need and the possibility of making climate change a vital national priority.

Comprehensive State action on climate change will require the participation of many agencies, as well as strong gubernatorial leadership. Although this report was prepared for NJDEP, the recommendations call directly on many State agencies to act. All recommendations point to the importance of the Governor placing climate change high on the State's agenda and instituting changes that will outlast his term, leaving a legacy for the State and the nation.

Goal 1: Establish New Jersey as a regional and national leader on climate change.

Rationale

With strong leadership, New Jersey can create effective, long lasting state climate change policies and serve as an important advocate for federal GHG emissions reduction legislation. Because of Governor Corzine's focus on economic growth issues and his business background, he is well placed to show that climate change policy can be compatible with economic growth. The steps recommended below would establish the policy framework necessary for creating enough local demand for clean energy technologies to support business development and job growth in the state.

Action Steps

1. Establish and implement a mandatory 2020 GHG emissions cap and an ambitious 2050 emissions reduction target.[c]

- **Set a mandatory GHG emissions cap at 20 percent below current (2006) levels by 2020[d] and a target of 80 percent below 1990 levels by 2050.[e]** The Governor should issue an Executive Order directing NJDEP to make rules for achieving the emissions reductions under the cap and target. NJDEP should oversee implementation, monitor progress and propose revisions of the cap and target if necessary in response to new scientific findings or technological advances.

- **Create a strong implementation framework:**

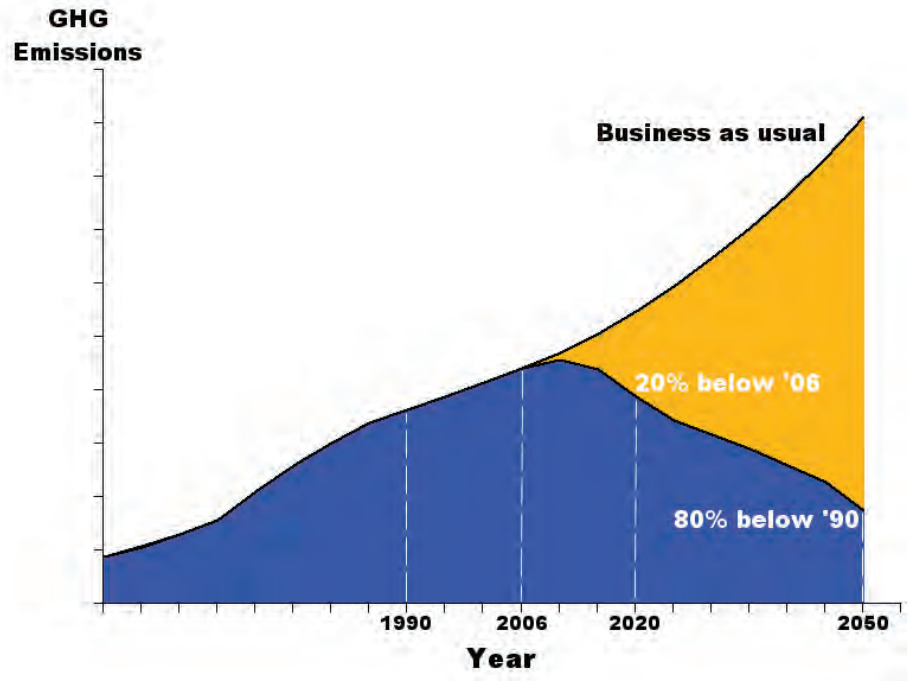
    - **Develop a Climate Change Plan and establish a platform for inter-agency communication and coordination on climate change.** The Governor should create and the NJDEP Commissioner should chair a high-level inter-agency task force that would develop a Plan[f] for achieving mandated emissions reductions and would serve as a forum for ongoing inter-agency coordination.[g] The Plan would specify comprehensive actions for all agencies and across all sectors to meet the medium-term cap and long-term target. The task force would track progress of the Plan's implementation by setting benchmarks and conducting regular evaluations to assess the performance of all agencies and sectors.

    - **Establish a Division of Climate Change within the Office of Economic Growth to coordinate State action and research and to serve as a visible information center on climate change in the state.** The Governor should appoint a Director of the new division who would be mandated to develop, implement and monitor the Climate Change Plan and to ensure action across all parts of State government to meet the State's climate change objectives.[h]

    - **Ensure good communication with stakeholders.** The Governor, in collaboration with NJDEP and the New Jersey Economic Development Authority (NJEDA), should convene a Stakeholder Advisory Council to obtain input from business, non-profit and advocacy organizations.[i]

    - **Ensure emissions reduction commitment outlasts the current administration.** The Governor and NJDEP should support legislation that would write the emission cap and target reductions into law.

- **Establish an economy-wide cap-and-trade system** to facilitate efficient progress toward the mandatory emissions limit. NJDEP and the New Jersey Board of Public Utilities (NJBPU) should expand the Regional Greenhouse Gas Initiative (RGGI) to cover other stationary sources of GHGs in addition to power plants, such as industrial plants and refineries. NJBPU should issue a rule to regulate emissions from non-RGGI state electricity



While many elements of a potential Climate Change Plan are addressed in this report, it is important to note that the recommendations included here will not be sufficient to reach the advised targets; further action will be required.

imports to eliminate emissions "leakage" that occurs when electricity from fossil fuel is imported from outside the state.

- **Increase funds for emissions reduction by auctioning 100 percent of carbon emissions allowances (tradable emissions credits) under RGGI.** The RGGI Model Rule requires member states to allocate a minimum 25 percent of their tradable allowances for "consumer benefit" or a "strategic energy purpose" with the remainder allocated to power generators based on historical emissions. New York and Vermont have announced plans to auction 100 percent of the emissions allowances under an expanded RGGI and use the revenues to reduce the cost of the program to consumers through investments in energy efficiency and clean energy technologies. New Jersey should follow suit.

- **Make emissions reduction targets a central and explicit objective of the Energy Master Plan (EMP).** The EMP's Resource Management Objectives should be based on the total GHG reductions needed to meet the 2020 cap and the 2050 target. NJBPU should ensure the EMP supports implementation of the Climate Change Plan.[j]

- **Mandate emissions reduction targets for all State agencies, departments, commissions, offices and authorities.** The Governor should expand the Director of Energy Savings' responsibilities to include assisting State entities in developing and implementing public, short and long-term emission reduction targets for key indicators of fossil fuel energy use.[k]

2. Raise New Jersey's profile as a regional and national leader on climate change.

- **Initiate a "Cool States" coalition** whose members commit to reducing GHG emissions through legally binding caps.[l] This initiative would impel federal action towards a national emissions limit and cap-and-trade system. Cool States would share best practices, build on regional agreements such as RGGI, organize events to promote clean technology and push collectively for federal climate change legislation. The initiative could be promoted through the National Governors' Association.

- **Convene a trans-Atlantic summit on climate change,** bringing together government, academic and business professionals from the United States, Europe and Canada (which combined emit over 60 percent of the world's GHGs). The summit would help position New Jersey as a climate change leader and heighten public awareness of climate change. It would also serve as a platform to address common concerns, share best practices and exhibit cutting-edge clean energy technology. The summit would showcase New Jersey's clean energy products and services and help attract clean energy businesses and industries to the state.

Goal 2: Spur economic growth and workforce development through new clean energy technology markets created by climate change policy.

Rationale

Smart action on climate change can support the Governor's Economic Growth Strategy by creating jobs, attracting new employers and cultivating a market leadership position in the rapidly growing clean energy technology and green building sectors.[m] New Jersey already has much of the infrastructure necessary to become a leader in clean energy technology innovation, including strong telecommunications, biotech, pharmaceuticals, nanotechnology and renewable energy industries. The State is reestablishing itself as a leader in technology development through a range of initiatives funded by the New Jersey Commission on Science and Technology (NJCST).[n] A statewide cap on GHG emissions, more stringent clean energy regulations and building codes and a focus on "green" businesses within the State's economic development apparatus will help build a market for "green" products and services, creating opportunities for businesses in New Jersey.

"As New Jerseyans, we realized long ago that our environment is one of the keys to our economic success and critical to our quality of life."
~ Governor Jon Corzine

Action Steps

1. **Invest in and support efficient and renewable energy technology businesses.**

   - **Establish a Division of Clean Energy Technologies within the New Jersey Economic Development Authority (NJEDA).** NJEDA is already tasked with supporting technology commercialization and emerging businesses through financing, real estate development and technical training and currently has staff available to focus on clean energy technologies but lacks expertise for monitoring and evaluation. NJEDA should hire a Clean Energy Technologies Division Director with experience in energy technologies who would be responsible for training and educating staff, in collaboration with the Treasury Department's Director of Energy Savings. The Division would function as a "one-stop shop" for parties interested in launching or expanding clean energy technology businesses.[o] The Division should sponsor conferences and forums that promote clean energy businesses and allow participants to showcase products and share best practices, building on NJBPU's *Clean Energy Conference* and Leadership Awards. NJEDA should also invite clean energy technology experts to join its advisory board to help direct investment strategies.

   - **Establish a focus on clean energy technology within the State's technology initiatives** including the Edison Innovation Fund and programs funded by the New Jersey Commission on Science and Technology (NJCST). The Office of Economic Growth should emphasize clean energy innovation as a key part of the Governor's Economic Growth Strategy.

   - **Create a business technology incubator to develop and commercialize efficient and renewable energy technologies** at Fort Monmouth, a location recommended by the Governor's Energy Transition Policy Group and in need of revitalization according to his Economic Growth Strategy.[p] This clean energy technology incubator would be added to the group of twelve incubators currently overseen by NJCST and NJEDA. The Fort Monmouth location would capitalize on the presence of scientific, technical and educational services related to the US Army's Communication and Electronics Command, scheduled to close by 2011 due to federal base relocation legislation.

"[Climate change] is an economic as well as an environmental initiative....
The good jobs of the future are going to be the ones that address this problem."
~ Former Governor Jim Florio

2. Connect "green" jobs to workforce development programs in high-unemployment urban areas.

- **Design and market a "green track" within the county colleges' vocational training schools, community-based training programs and union apprenticeships** to prepare students for green building construction, installation and maintenance of energy-efficient and renewable energy equipment and auto-mechanic services for hybrid and plug-in vehicles.[q] The New Jersey Department of Labor and Workforce Development should work to connect program graduates to union-based apprenticeship programs, work on State facilities and work on projects receiving State financing or other incentives.

- **Designate the city of Newark as a "Green Gold" pilot city.** The pilot program would serve as a demonstration project on how a growth-oriented climate change strategy can benefit the state's low-income urban residents. It would focus on three goals: lowering energy costs for residents and businesses; supporting green building standards in new construction; and training and placing under- and unemployed workers in green construction, installation and maintenance jobs in the city and regionally. (See Appendix for more details.)

- **Stimulate demand by linking State incentives to green building standards** especially for projects that engage in "first source" hiring practices that target low-income residents, women and minorities. Possible linkages include:

    - Tying Brownfield redevelopment funding to commitments to rebuild at "Silver" Leadership in Energy and Environmental Design (LEED) standard or equivalent where financially feasible;

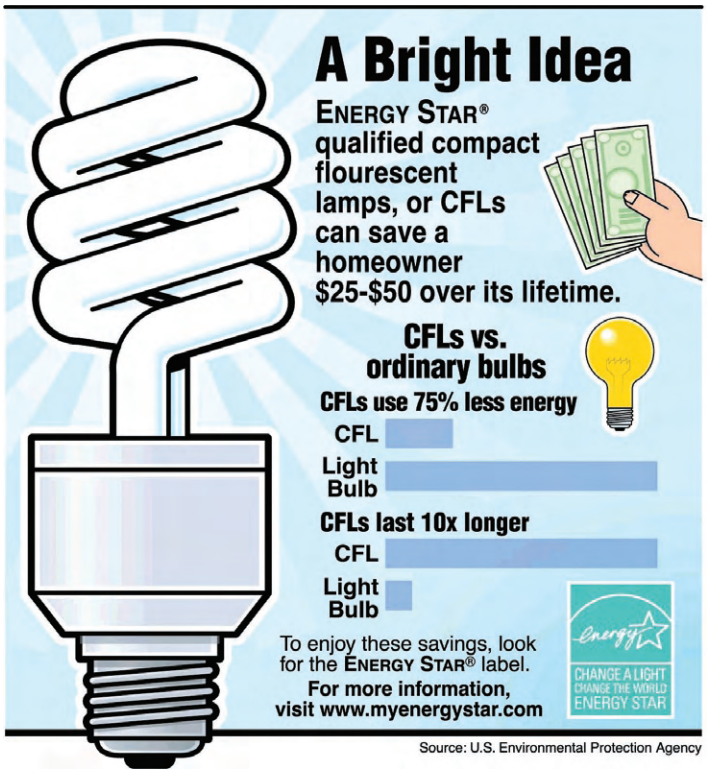
    - Including green building as a factor in eligibility for the 30 percent Business Employment Incentive Program (BEIP)[r] if the project participates in a "first source" hiring agreement with organizations based in distressed communities.

    - Dedicating an additional half percent of public project construction costs to training and placement of green building workers.[s]

Morris County School of Technology (MCST) is pursing the US Green Building Coalition Leadership in Energy and Environmental Design (LEED) Gold Rating as it is converted from a vocational school into a full-time high school. The building's rainwater system will reduce water use by 30 percent. The plan optimizes energy performance through a gas-fired turbine generator and absorber plant. In addition, the project includes high recycled content, a 50kw photovoltaic system, certified woods, a rainwater catchment to flush all toilets and high efficiency lighting fixtures.

Goal 3: Boost energy efficiency gains through new incentives and regulatory measures and more funding and better targeting in existing State programs.

Rationale



Increasing energy efficiency is the quickest and most cost-effective way to reduce GHG emissions. Efficiency gains can spur economic growth by lowering production costs and reducing energy bills. Strong local demand for energy efficiency technologies and services can also drive job development in New Jersey's clean energy technology sector. The Governor has set a goal of reducing New Jersey's projected energy use by 20 percent by 2020 and has created the position of Director of Energy Savings to reduce energy use within State facilities. The State already runs many innovative efficiency programs. Efforts are underway to bring the New Jersey Uniform Construction Code up to the latest national standard and to allow the Code to exceed that standard where feasible.[t] Despite these achievements, New Jersey's Clean Energy Program (CEP) could do more to reduce GHG emissions, for example by reallocating its funding to prioritize climate change goals. The recent transition of management of energy efficiency programs from the state's utilities to a new contractor hired by NJBPU raises questions about the role of utilities in future efficiency efforts. With the correct policy changes, New Jersey could get substantially more emissions reductions for each dollar spent on energy efficiency programs.

Action Steps

1. Change business incentives through an energy use surcharge that lowers corporate taxes and rewards energy-efficient businesses.

- **Impose an "Energy Surcharge" on energy purchased by business and industrial users, along the lines of the highly successful UK Climate Change Levy.** NJDEP and the Governor should propose and support legislation that would authorize the State to collect the energy surcharge and offset the increased costs to business through lower corporate payroll taxes. This would alter business incentives, encouraging energy conservation and efficiency without imposing new unavoidable costs on businesses. The reduction in payroll taxes would also have the benefit of reducing the cost of new hires, possibly spurring additional employment. Efficient businesses would be rewarded twice: once through a reduction in their surcharge and again through savings on energy consumption.[u] The surcharge would vary according to the carbon intensity of the energy used: renewable energy and cogeneration would be exempt. A small percentage of revenue could be used to fund staff at the CEP or a contracted non-profit to provide direct technical assistance to businesses to reduce carbon emissions.

2. Motivate households through increased promotion of energy-efficient equipment.

- Fully fund and staff ENERGY STAR Products[v] and work with major supermarket and drugstore chains to feature discounts on energy-efficient light bulbs and appliances.
- Develop a pilot program to "climate test" the homes of students in public schools as part of a larger curriculum on climate change. Such a program would include the distribution of coupons redeemable for discounted efficiency

products such as compact fluorescent bulbs at local participating stores. This would increase foot-traffic to local businesses and give them an incentive to stock energy-efficient products.[w]

- Explore the possibility of tying investments in energy-efficient or renewable generation products and services to property tax relief, up to a capped amount.[x]

3. Maximize emissions reductions through "Demand-Side Management" of energy supply including decoupling profits from sales and moving to a Portfolio Management system.

- The Energy Master Plan (EMP) should call for decoupling energy sales from profits to allow distributors to profit from efficiency gains. Current discussions about the EMP contemplate establishing an Energy Efficiency Resource Standard (EERS) that would require utilities to meet a set portion of their demand through efficiency gains. This is an important step, but the Master Plan should also consider moving to a Portfolio Management approach, which would require utilities to conduct their own assessments about least-cost solutions for meeting energy demand.[y]

4. Motivate developers by tying State incentive programs to efficiency gains.

- Enhance existing programs, such as the Smart Start Building program, by making energy-efficient design and appliance installation a factor in eligibility for the 30 percent bonus available to "smart growth" projects receiving Business Employment Incentive Program (BEIP) grants. Explore offering higher Brownfield redevelopment funds to energy-efficient redevelopment projects in conjunction with incentives for "green building" and first-source agreements for local hiring as discussed in the "Economic Development" section of this report. Costs for deepened incentives could be offset by reduced incentive packages for BEIP recipients that locate outside of "Smart Growth" areas.

5. Increase funding for effective State energy efficiency programs and ensure that funding targets cost-effective GHG emissions reductions.

- **Increase funding for the Clean Energy Program (CEP) by auctioning 100 percent of New Jersey's carbon allowances under RGGI** as recommended in the "Leadership" section of this report. Revenue generated by auction should be earmarked for programs that demonstrate the highest level of GHG emissions reduction per dollar spent (for example the Commercial and Industrial retrofit program) rather than CEP general budget, which is subject to competing priorities. The State should also consider a small increase to the Societal Benefits Charge, which currently funds the CEP.

- **Increase the priority given to emissions reduction when allocating funding under the Clean Energy Program.** Although the CEP offers a variety of successful strategies for boosting energy efficiency and despite thorough program evaluation by staff, current funding allocations do not promote the most efficient use of resources for reducing emissions. Emissions reduction should be elevated as a criterion for funding allocation decisions to prioritize programs that have the largest and most cost-effective impact on emissions reductions.[z] Rebates for solar panels, currently experiencing a severe backlog due to oversubscription, should be sharply reduced and plans to move to a Solar Renewable Energy Certificate trading program should be accelerated to free scarce CEP funds for other uses.

"If anyone doubts the potential of energy efficiency programs to reduce energy costs, cleanup the environment and create jobs – they should talk to the Jewish Community Center of Atlantic City."
~ Governor Jon Corzine

Case Study: Jewish Community Center of Atlantic County

The Milton and Betty Katz Jewish Community Center installed high-efficiency heating and cooling systems, new window treatments, lighting systems and other upgrades. The annual energy costs savings exceeded 32 thousand dollars. In just over two years, they will cover the entire cost of the efficiency upgrades.

Goal 4: Make transportation more efficient and development smarter.

Rationale

Transportation accounts for over 40 percent of New Jersey's GHG emissions and is the fastest growing source of emissions in the state, due to a decline in average vehicle fuel economy and to an increase in vehicle miles driven. Reducing transportation sector emissions must therefore be part of any meaningful climate change policy. New Jersey adopted the Clean Cars Act in 2004, which requires substantial reductions in emissions from new vehicles sold in-state beginning in 2009. The State could reduce emissions further by promoting smart growth and transit-oriented development and by encouraging government entities and schools to purchase cleaner vehicles.

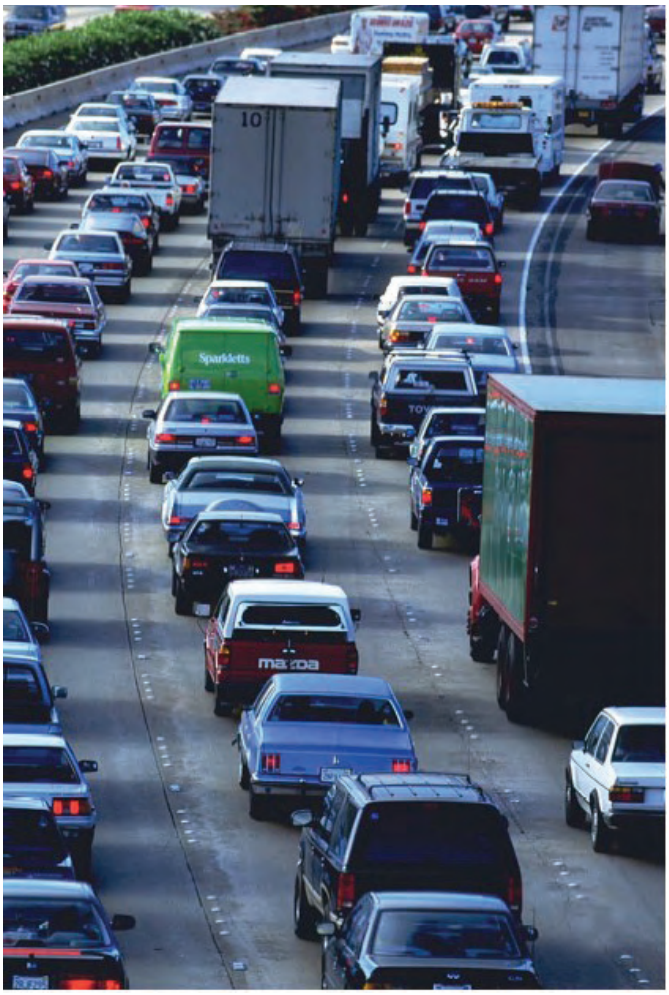
Action Steps

1. Encourage a reduction in Vehicle Miles Traveled (VMT) by revising State planning documents and aggressively promoting transit-oriented development.

- **Make emissions reduction through reduced VMT an explicit part of key State planning documents,** including the State Development and Redevelopment Plan and the Governor's Economic Growth Strategy. The New Jersey Office of Smart Growth (NJOSG) should map all land within a half mile of transit hubs in the State as transit-friendly development priority areas.[aa] This will help to increase development on the transit grid. NJOSG should prioritize for endorsement municipal general plans that explicitly adopt VMT reduction as a goal of transportation and community planning. The Governor's Economic Growth Strategy should explicitly address the goal of reducing VMT by including increased investments in mass transit and freight transport and focusing on inland areas.[ab]

- **Facilitate VMT reduction by regional planning along transit corridors.** NJOSG should identify all major highway corridors and encourage municipalities along these corridors to be involved in the State's regional planning efforts, including Route 1 Regional Smart Growth Strategy. This can be done by facilitating the establishment of associations of municipalities concerned with regional traffic problems.[ac] These groups should work with NJOSG to develop in ways that help to reduce the number of miles its residents must drive for daily errands as well as providing increased transit options for trips to frequented locations. This will help ensure that increasing development in individual municipalities does not adversely affect the region's quality of life and economic competitiveness by continually increasing traffic on the shared highway corridor.

- **Encourage and expedite transit-friendly development on appropriate state-owned lands.** The New Jersey Department of Transportation (NJDOT) and NJTransit should prioritize State-owned properties for "transit-friendly development" and partner with municipalities to leverage State and federal programs to help fund transit-oriented infill or redevelopment efforts on state properties.[ad] NJDOT, NJTransit and NJOSG should seek more funding to bolster their already wide public education efforts about transit-friendly land use and transit-friendly development.



Prospects for a Biofuels Standard in New Jersey

The State lacks the feedstock and infrastructure capacity to support a robust biofuels standard that benefits the State economically while bringing about significant carbon emissions reductions. Although enacting a biofuels standard is not recommended at this time, the State should invest in research, development and commercialization of cellulosic ethanol and biodiesel from waste-grease.

Eventually, New Jersey could establish a biofuels standard similar to that of Washington State: Washington mandates that all biodiesel contain a minimum two percent biodiesel blend. The requirement increases to five percent once in-state feedstock can provide at least three percent of the requirement.

2. Increase public awareness and strengthen regulatory support for practices that reduce VMT.

- **Encourage transit ridership and spread awareness by expanding existing public transit programs and infrastructure:** NJTransit and NJDOT should expand the "ozone alert days" program in coordination with statewide transit cross-promotion days,[ae] NJTransit should more aggressively market the Smart Commute Initiative, which gives incentives for transit ridership among home buyers and partner with cities in need of redevelopment to get municipalities to match the incentives given home buyers under the program.[af] Governor Corzine should commit to supporting these efforts and to investing in the expansion of transit infrastructure and the availability of transit.

- **Boost regulations and programs that increase automobile efficiency and encourage/require carpooling.** NJDOT should encourage the sale of energy-saving replacement tires and work with the Division of Consumer Affairs to promote better tire-inflation practices and proper oil changes – practices that can dramatically improve fuel efficiency – through an educational campaign.[ag] NJDOT and the New Jersey Department of Banking and Insurance (NJDOBI) should support legislation requiring automobile insurers to offer pay-as-you-drive automobile insurance, in which premiums are calculated by the mile, rewarding those who drive less.[ah] NJDOT should require large employers to take advantage of current programs discouraging single-passenger commuting and develop other options for reducing VMT of their employees.[ai]

3. Promote alternative fuels and increased fuel economy.

- **Advocate for increased federal fuel economy standards.** The Governor and NJDEP should push for an increase in federal fuel economy standards for passenger vehicles to at least 40 miles per gallon (mpg) within the next decade.[aj]

- **Lead by example: Reduce emissions from the State government's vehicle fleet.** Require the State to procure more alternative fueled, hybrid-electric or other advanced technology vehicles as they become technologically and economically feasible.[ak] In the interim, require that all vehicles have a minimum fuel economy of 30 miles per gallon unless exempted by NJDEP. Since 1997, the State has been acquiring alternative fuel vehicles in line with the 1992 Energy Policy Act. A larger bulk purchase commitment by the State will increase market demand for alternative fuels and vehicles, spurring technology innovation and driving down the cost of existing technologies.[al]

- **Encourage the purchase and use of alternative fuels by local governments and schools by expanding funding for the NJ Clean Cities Program.** The NJBPU Clean Cities Program offers rebates for the conversion or purchase of alternative fuel or hybrid electric vehicles by local governments, State colleges and universities, school districts and other government entities. Another rebate program offsets the incremental cost of biodiesel and the cost of installing refueling infrastructure for alternative fuels. The number of requests for rebates consistently exceeds available funding. Successful large-scale transition to alternative fueled-vehicles requires an expanded long-term funding commitment from both NJBPU and the State legislature.

Goal 5: Improve State preparedness to cope with sea level rise and increased frequency and intensity of storms.

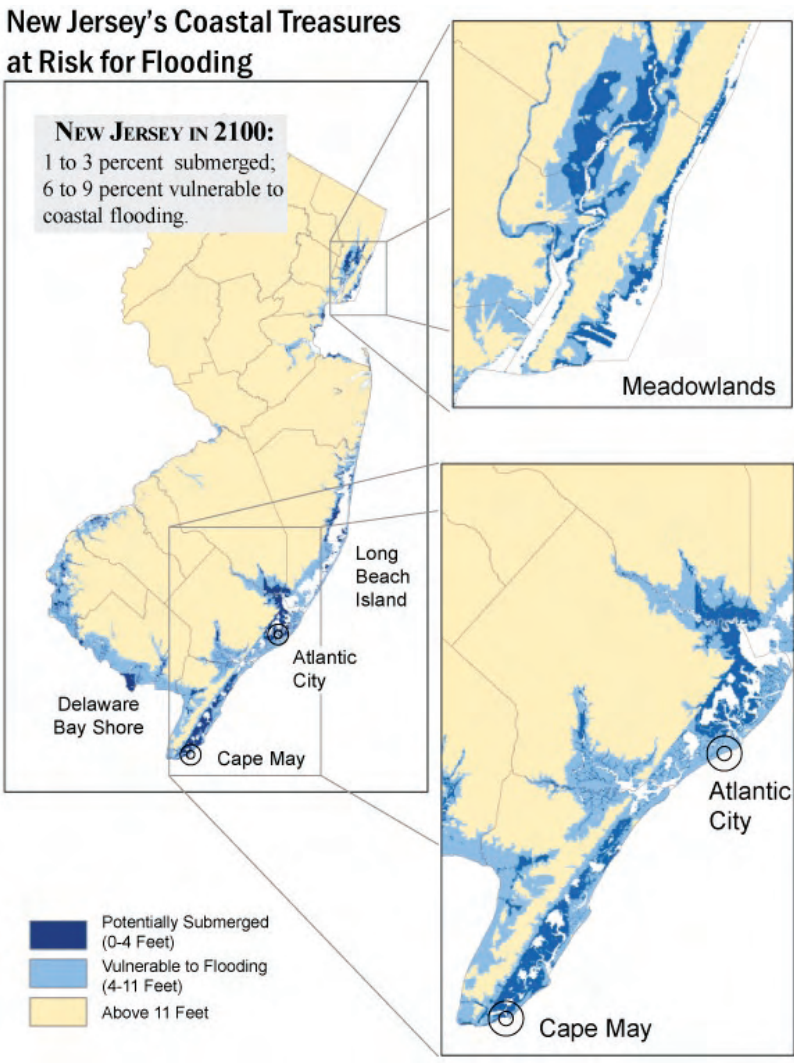
Rationale

Even if all nations halted emissions today, global average temperatures would continue to rise in response to past emissions. Sea level rise is thus expected to continue and may accelerate well beyond the twenty-first century. Additionally, warmer waters will continue to increase the incidence and power of storms. The resulting impact on stormwater flow and river flooding when coupled with sea level rise makes coastal hazards far more dangerous than ever before. Inevitably, powerful storms will severely damage barrier island development and could eventually render some areas of the Jersey shore uninhabitable. New Jersey must prepare now for these impacts rather than wait for a crisis to happen.

Action Steps

1. Produce vulnerability and economic impact reports evaluating various climate change scenarios, in order to raise public awareness, update state law and improve planning decisions at both state and local levels.

- **Identify areas vulnerable to adverse climate change impacts.** Using climate change data, NJDEP should map areas vulnerable to various climate change impacts, including increasing sea level rise, episodic flooding, storm surge heights, shoreline erosion, increased rainfall and stormwater volumes and harsher coastal storms. NJDEP should map multiple scenarios of sea level rise and increasing storm frequency and intensity in order to distinguish areas particularly vulnerable to flooding and/or inundation and should update the maps every five years. The maps should be made publicly available online and should be included in materials presented at informational meetings with other State agencies, municipal governments, insurance companies and non-profit organizations to educate stakeholders about the potential impacts of climate change.[am]



- **Quantify the economic impact of climate change in vulnerable coastal areas.** NJDEP should commission an impact report modeled after the Stern Review Report that identifies the costs of various coastal hazards and storm events.[an] The report should analyze the potential costs to New Jersey in terms of damaged public and private property, loss of life, destruction of natural resources and disruption of business activities, including tourism.[ao] The report should include cost-benefit analyses of different coastal zone management options for short- and long-term response to gradual sea-level rise and coastal hazard intensification.[ap] These analyses should also evaluate various alternatives for pre-storm planning including: 1) status quo policy; 2) enhanced protection using both hard and soft measures; 3) enhanced protection using soft measures only; and 4) gradual retreat from the most vulnerable areas and protection in other areas.[aq] The report should be made accessible to the public and updated every five years.

2. Enhance pre-storm planning for post-storm recovery by incorporating climate change impacts into short- and long-term coastal planning.

- **Develop long-term management plans for coastal transformation**. NJDEP should use the economic impact reports and vulnerability analyses discussed above, as well as scientific projections of anticipated changes to the coast due to climate change to develop long-term plans, made for 25, 50 and 100 year time horizons.[ar] The plans should include maps that predict how the geology of the coast changes depending on the interaction of climate change impacts with different coastal management strategies.[as] Based on long-term planning and economic impact reports, NJDEP should identify which areas of the coast should be protected and which should be targeted for gradual retreat, either immediately or during post-storm recovery.[at] If the future economic costs of increased coastal hazards in a particular area are expected to be greater than the economic benefits of rebuilding the area, taking into account enjoyment of the beach, tourism industry, current development, potential new development and other business, NJDEP should use The Coastal Area Facility Review Act (CAFRA) regulatory powers to prevent new development and force retreat from properties damaged by the next storm.

- **Prepare for the possibility of long-term retreat from vulnerable areas.** NJDEP should require all development projects connected to sewer systems and located within 150 feet of the mean high tide line to submit rolling conservation easements in exchange for CAFRA permits.[au] These easements, which dedicate land or rights-of-way for public access to coastal lands and waters, would ensure that if a retreat plan is adopted in the future, current development would be able to be abandoned gradually without imposing regulations that may be considered government "takings" under land use law. The rights to the land and the required public rights-of-way would "roll" inland as sea level rises and the coastline moves, ensuring that public access does not diminish as beaches and tidelands are squeezed between rising sea levels and private development.[av] Property owners with these easements would be prohibited from placing hard structures on their land. Rolling easements do not restrict current development activity because they only take effect if beach nourishment slows and sea level rise pushes the mean high tide line onto private property. Rolling easements are thus ideal for gradual retreat.[aw]

- **Update rules and regulations to account for climate change impacts.** NJDEP should immediately re-map and update Erosion Hazard Areas to account for faster erosion rates resulting from sea-level rise; wetlands expansion due to sea level rise, including increasing wetland buffers to account for predicted wetland migration;[ax] Flood Hazard Area Control Act buffers to account for observed and projected increases in stormwater flow to rivers; and Tidelands areas, including increasing the areas where riparian rights apply in order to account for sea level rise.[ay]

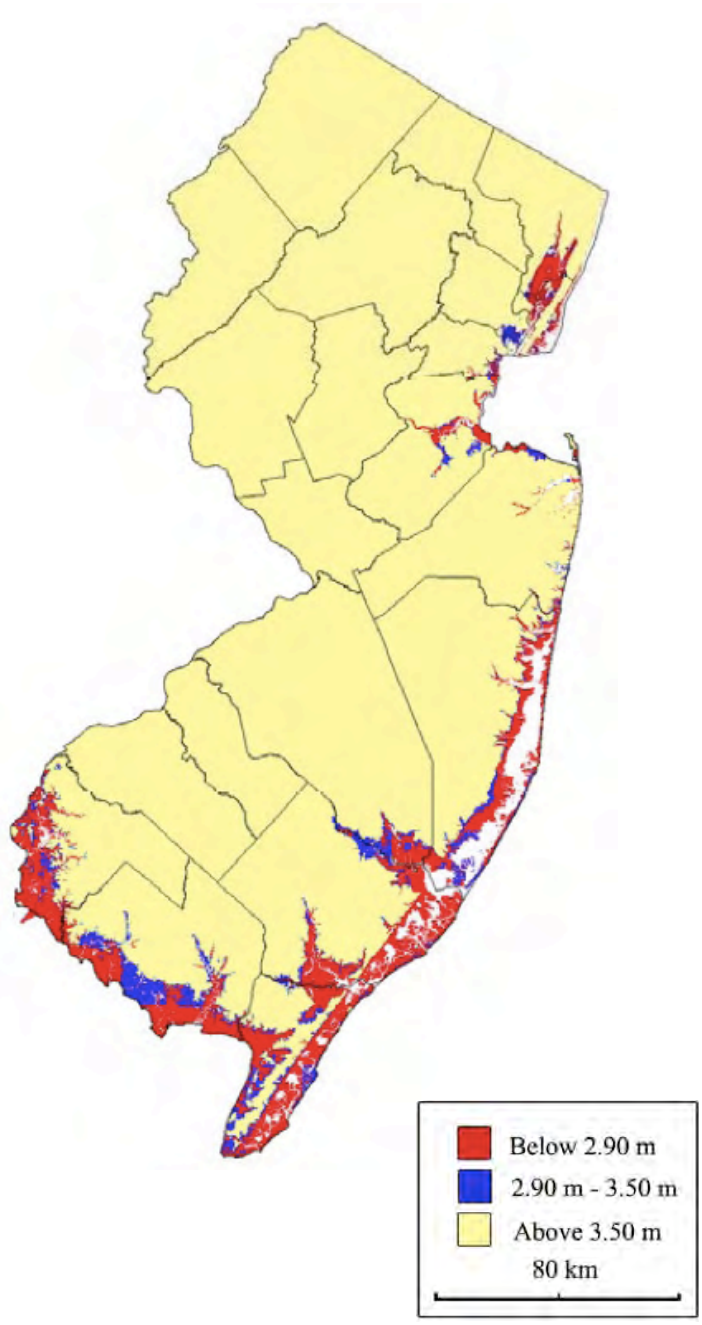
3. Encourage municipal adaptation planning through a "Dry Cities" program sponsored jointly by NJDEP and NJOSG. NJDEP should provide technical support and NJOSG should prioritize plan endorsement for municipalities that take part in the "Dry Cities" program.[az] NJDEP and NJOSG should help municipalities use climate change vulnerability and economic impact analyses to update master plans and zoning ordinances to plan for post-storm recovery and anticipate climate change impacts, including sea level rise, storm surge height increases and floodplain expansion. "Dry Cities" should update master plans and zoning by:

- **Adopting FEMA-approved multi-hazard mitigation plans**[ba] and updating them to account for climate change vulnerability.
- **Changing zoning ordinances** to ensure that post-storm reconstruction within all vulnerable areas abides by storm damage mitigation design rules.[bb]
- **Designating the most vulnerable areas** within a municipality as environmentally sensitive planning and zoning areas prioritized for recreational open space and conservation. In these areas, new development should be discouraged and post-storm reconstruction should be prohibited. The State should identify certain exempted areas where new development and reconstruction should take place after catastrophic storms, but only if justified by both population density and economic value, according to the economic impact analyses recommended above.[bc] However, municipalities in "exempted" areas would still need to begin to plan for long-term adaptation to climate change impacts.[bd] Development in Atlantic City, for example, would be likely to continue and to be reconstructed if damaged, but its public officials would have to agree to pursue more robust shore protection measures, including increased beach nourishment, more advanced dune management strategies and possibly investment in jetties and dikes to further protect the hotel and tourist area from future storm damage.
- **Encouraging the transfer of development rights (TDR) from high vulnerability areas** where reconstruction is discouraged to low vulnerability areas and/or areas in need of redevelopment by designating high vulnerability areas as TDR "sending zones" under the Municipal Land Use Law (MLUL). NJDEP and "Dry Cities" should push the NJ legislature to expand the MLUL so that coastal development rights could be received in TDR "receiving zones" which could be areas in need of redevelopment throughout the state.

4. Preserve land strategically to protect natural resources from the impacts of climate change through partnerships among NJDEP, NJOSG and non-profit conservation organizations and municipalities. Preservation could be achieved through acquisition, regulation and NJOSG's planning process.

- **Update the New Jersey Landscape Project to account for climate-change induced habitat change.** NJDEP should use the Project and accompanying data to inform strategic land conservation by producing and making publicly available natural resource vulnerability maps identifying where wetlands and other habitat loss and climate-change induced species migration may occur.[be] NJOSG should incorporate information from the maps into criteria for environmentally sensitive planning areas in the State Plan Policy Map, beginning

Estimated coastal land area susceptible to episodic flooding



with incorporation of endangered species habitats and buffers for wetlands and Category One waters.[bf]

- **Form partnerships with conservation organizations so that land conservation proactively preserves natural resources at risk from climate change.** NJDEP should pursue partnerships that would augment NJOSG planning efforts and help ensure that actions are taken to preserve migrating habitats, including making way for wetland migration paths. Partnerships would enhance chances for maintaining lands in corridors or "greenways" that are suitable for habitat preservation, species migration and public enjoyment of nature.[bg]

5. Enhance preparedness for more frequent and intense storms through improved emergency management plans and a clear chain of command.

- **Update emergency planning scenarios to take into account climate change impacts**. NJDEP, together with the New Jersey Office of Emergency Management should support current legislative efforts at emergency preparedness[bh] by re-formulating road flooding and congestion scenarios and amending or improving current evacuation routes to prepare for anticipated higher storm surge levels, increased precipitation and increased storm frequencies due to climate change.

- **Create a culture of emergency preparedness** in coastal and flood-prone areas by training State agency staff and residents to react effectively in case of coastal emergencies. All State agencies with emergency response duties should undergo periodic catastrophic storm simulations where they interact as a team.[bi] NJDEP should also ensure that the population is aware of the pertinent authorities to turn to in case of catastrophes. NJDEP should incorporate "best practices" from other jurisdictions that experience periodic natural hazards that have developed an effective culture of preparedness into their pre-storm planning process.[bj]

6. Partner with the insurance industry to develop a climate change risk management strategy. The insurance industry, by sending a market signal that a heightened level of risk exists due to climate change along the coast, can promote better risk management and play an important role in providing incentives to adopt adaptation measures. If insurers increase premiums for properties vulnerable to climate change, then homeowners will better understand their level of risk as a result of living in vulnerable locations. NJDEP and NJDOBI should:

- **Work with insurers to encourage coastal residents to purchase flood insurance,** so that residents will be covered in case of a catastrophic loss.

- **Help individual insurers collect the information** they need to accurately price the risk of insuring properties in the floodplain.

- **Encourage insurers to provide financial incentives** for residents to make disaster-prevention home improvements.

- **Require insurers to purchase adequate reinsurance.**[bk]

- **Establish a coastal infrastructure rebuilding fund** by collaborating with the New Jersey legislature, coastal municipalities and insurance companies to establish a coastal infrastructure rebuilding fund that would pay for the rebuilding of infrastructure after a storm.

Flooding in Hunterdon County, New Jersey, 2004.

Graphic taken from the cover of a report from the Climate Change Communication Initiative led by the UK Department of Environment, Food and Rural Affairs. See Appendix 6 for more information.

Goal 6: Increase public support for climate change mitigation and coastal adaptation policies by raising awareness.

Rationale

Increasing public awareness and acceptance is essential to implementing policies that reduce emissions and protect New Jersey's coast. Better education and access to information will make New Jersey residents more likely to support better climate change policies. The recommendations on public awareness and education in the draft New Jersey Energy Master Plan provide very good overall suggestions for what the state can do in the future;[bl] the recommendations below offer examples of what NJDEP can do right now.

Action Steps

1. Create a state-wide public awareness campaign on climate change and steps residents can take to mitigate it. Through the use of a variety of media, including print and radio advertisements and a more user-friendly website, NJDEP can raise awareness and provide information to the public, businesses and non-profit organizations to spur greater support for climate change policies. The goal of the public awareness campaign would be to make reducing emissions and protecting the coasts a normal part of life for New Jersey residents.[bm]

- **Develop and maintain a dynamic, user-friendly, regularly updated website** to serve as a portal for anyone seeking information on climate change in New Jersey. Information on the website should be geared toward the distinct interests of businesses, households and non-profit organizations. The website would provide scientific updates about climate change, everyday strategies for reducing emissions and information about environmental regulations, energy-efficient equipment and educational programs.
- **Advertise on print, radio and television media.** The use of print media including newspaper advertisements, billboards and posters is vital to reach people who lack ready access to the Internet or who might not seek out information on their own. NJDEP should contract with advertising and marketing professionals to craft messages linked to particular State programs or campaigns.

Billboard Sign in Adelaide, Australia

Model Examples of Websites and Campaigns from Califonia, the Ad Council, and the United Kingdom to Disseminate Information and Raise Awareness. (See Appendix 6 for more information about these websites, disseminating information, planning, implementation and funding.)

2. Advocate for the continuation and expansion of environmental education in New Jersey's public schools.

- **NJDEP should advocate for the continued presence of earth sciences,** including climate change education, in the curriculum of New Jersey high school students. The New Jersey High School Redesign Steering Committee, a major statewide initiative promoting more rigorous standards for students, proposes restricting high school science curricula to biology, chemistry and physics, which would limit students' exposure to climate change education. NJDEP should officially petition the New Jersey High School Redesign Steering Committee to reconsider this recommendation.

- **NJDEP should ensure that cutting-edge information about climate change is an integral component of the revised science curriculum,** known as the "core content standards." The revision of the science standards for the State will begin in 2008-2009. NJDEP should develop a curriculum about climate change to be taught in grades K-12 and should work with Department of Education to ensure that the material is included in the core standards.

3. Promote energy efficiency practices, products and services.

- **The NJBPU, in cooperation with utility companies, should engage in promotional campaigns** that highlight efficiency and conservation measures.

- **NJEDA, in collaboration with local businesses, should promote an informational "Powered by New Jersey Clean Tech" campaign** to promote New Jersey products and services to consumers, businesses and large institutional purchasers such as universities and hospitals.

4. Maximize funding by leveraging out-of-state resources.

- **NJDEP should apply for a US Environmental Protection Agency grant** to increase state capacity for education and outreach on the environment.[bn]

- **The NJDEP website and materials should provide materials and information** about funding opportunities to non-profit agencies that engage in climate change education within New Jersey.

- **NJDEP should partner with utilities, major in-state businesses and national corporations interested in promoting a "green" corporate image** to provide support and resources for the awareness campaign.

South Australia's Greenhouse Strategy Web Site: Tackling Climate Change

Notes and References

a Cooper, Matthew J.P., Michael D. Beevers and Michael Oppenheimer. "Future Sea Level Rise and the New Jersey Coast: Assessing Potential Impacts and Opportunities." Princeton University, Woodrow Wilson School of Public and International Affairs, Science, Technology and Environmental Policy Program. November 2005. http://region.princeton.edu/pub_detail_23.html

b "Stern Review on the economics of climate change." HM Treasury. October 2006. http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm. The report, commissioned by the British government to quantify the economic impact of climate change, estimated that mitigation would cost only one percent of global GDP. In addition, transitioning to a low-carbon economy is estimated to create significant economic opportunities projected to be worth at least $500 billion by 2050.

c The emissions reduction targets should be based on end-use consumption and include emissions from imported electricity and fuels as well as in-state generated emissions.

d Reducing emissions to 20 percent below current (2006) levels is roughly equivalent to returning to 1990 levels, a target recently set by California.

e See Appendix 1 for further discussion of the recommended target and a state-by-state comparison chart of recently promulgated targets.

f This plan would be new and unrelated to the Greenhouse Gas Action Plan used by NJDEP in past years.

g The task force should consist of leaders of state agencies, including but not limited to: the Board of Public Utilities, the New Jersey Economic Development Authority, the Office of Economic Growth, the Office of Smart Growth and the Department of the Treasury through the Director of Energy Savings. (See Appendix 1 for descriptions of climate change task forces and advisory councils in nine other states.)

h Although the Director would be a new position and while it may be necessary to hire several additional staff members, this division would be largely staffed by current NJDEP employees who already perform relevant functions.

i The Climate Change Stakeholder Advisory Council would be modeled after Governor Corzine's Council on Economic Growth, which advises the Office of Economic Growth in its implementation of a new development strategy for the state.

j The economic assessment related to the EMP should consider the benefits and avoided costs of climate change mitigation, in addition to projected energy savings and job growth potential.

k Possible indicators include vehicle miles traveled, fleet composition and fuel economy, alternative fuel requirements, gallons of gasoline and diesel purchased, commute trip reduction plans, green building standards, energy use, equipment procurement (based on a lifetime capital and projected energy cost basis), recycled content of paper purchased and use of toxic chemicals. If state employees engage in air travel in the future, agencies should consider purchasing carbon offsets that invest a small percentage of the cost of the flight in projects that absorb an equivalent amount of carbon dioxide from the atmosphere (e.g., renewable energy projects that reduce demand for fossil fuel consumption), making the journey 'carbon neutral'. The UK government, for example, requires this for all official travel.

l The coalition would be analogous to Seattle's "Cool Cities Initiative." See http://www.seattle.gov/mayor/climate and http://www.coolcities.us/ for details.

m Clean energy technology includes renewable energy generation, biofuels, conservation technology and efficient energy management systems (see Appendix 2 for specific examples). The renewable energy sector is estimated to earn $40 billion in 2008 globally. New Jersey's recent decision to obtain 20 percent of its energy from renewable sources could create up to 11,700 jobs in the state, according to a study by Rutgers University. These jobs would generate nearly $160 million in additional earnings and more than $17 million in additional tax revenues. ("Economic Impact Analysis of New Jersey's Proposed 20% Renewable Portfolio Standard." Center for Energy, Economic and Environmental Policy. December 8, 2004. http://www.policy.rutgers.edu/ceeep/images/RPS%20Report%20Text-Final.pdf.)

n See Appendix 2 for a list of current policies supporting clean energy technology in New Jersey and selected programs supporting clean technology in other states.

o The Division's roles would include providing guidance on issues such as site location, permits, access and transportation and assembling financing packages.

p Currently, focusing on renewable and other advanced energy technologies is one of several options under consideration for the Fort.

q As an example, Isles, a Trenton-based non-profit, is already pursuing a program that would train youth to install solar panels. For more information, see http://www.isles.org/pdf/solar_panel_ed2.pdf.

r BEIP grants offer businesses that move to or expand in New Jersey significant reductions in state corporate taxes. For more information on the BEIP program, see: http://www.njeda.com/pdfs/BEIP_Fact%20Sheet.pdf.

s The State already dedicates half a percent of construction costs to outreach and training of minorities and women seeking construction jobs.

t Senate bill 2154 would allow New Jersey's code to exceed national model codes under certain conditions. See New Jersey Public Interest Research Group's Winter 2006 report on Energy Efficiency for more detail on building code improvements: "On the Road to Energy Independence: Controlling New Jersey's Runaway Energy Demand Through Energy Efficiency," http://www.environmentnewjersey.org/uploads/im/ha/imhaw6LI0MJP8WtY-qIfxA/On_The_Road.pdf.

u The Climate Change Levy in the UK has led to substantial reductions in carbon emissions (on track to reduce emissions by 3.7 million tons of carbon per year by 2010) while actually returning a net benefit to companies through other tax reductions (See Appendix 3 for more details or visit http://www.defra.gov.uk/environment/ccl/intro.htm.)

v Energy Star Products is a federally sponsored program that encourages the purchase of energy-efficient products. For more information, see: http://www.energystar.gov.

w The student project envisioned here would not require purchases, but would include monitoring the amount and cost of energy used in students' homes.

x See Appendix 3 for a description of programs from other states linking investment in efficiency and renewables to property tax relief.

y Since energy efficiency is generally the least-cost way to meet energy demand, a Portfolio Management system, which requires least-cost accounting, maximizes the amount of energy demand obtained from efficiency gains.

z This recommendation does not include de-funding the Low-Income Housing program, which offers significant equity benefits that offset inefficiencies in reducing GHG emissions. See Appendix 3 for a chart showing the cost effectiveness of selected 2005 CEP programs in reducing energy use.

aa "Transit hubs" should include all train and light rail stations (including PATCO and PATH), major bus stations and stops on express bus routes.

ab Other important climate change related changes to the Economic Growth Strategy could include altering the "sustainable development" goal to include a specific reference to climate change, dedicating a portion of the NJ Urban Fund to the upfront costs of green-building development and devoting part of State innovation funds to clean energy technology innovation.

ac For more information on the Route 1 Regional Smart Growth Strategy, see: http://www.route1brt.com/, http://www.njtransit.com/an_cp_project072.shtml, http://www.state.nj.us/transportation/works/njfit/case/.

ad To show how Transit-Oriented Development can work for economic development in cities, efforts in Camden around the river line should be given more staff time and more agencies should get involved. Camden revitalization can serve as a pilot for joint development efforts for transit-friendly developments and transit villages throughout the state.

ae NJT should run cross-promotions with tourist destinations on a weekend day while on weekdays encouraging employers to induce employees to ride transit and not drive for the day. See Appendix 4 for a model for this program from San Francisco Bay's "Spare the Air" days.

af Municipalities should be encouraged to embrace the program as a way to increase homeownership among working families and also a way to regain population. Smart Commute initiative is a Fannie Mae program which applies the savings due to mass transit use to income levels and lowers the down-payment on a mortgage. NJTransit augments the incentive by offering a monthly transit pass to program participants for the first month.

ag The Division of Consumer Affairs in the New Jersey Office of Attorney General's Department of Law and Public Safety launched a "Safe Trip" Campaign in 2002, a nationwide public awareness campaign on tire safety, http://www.state.nj.us/lps/ca/press/tiresafe.htm. The Division also maintains an Automotive Services website that describes how to improve vehicle fuel economy through regular engine maintenance http://www.state.nj.us/lps/ca/fstone/engine/index.html. The educational campaign should build on these existing resources.

ah See Appendix 4 for a description of how pay-as-you-drive insurance works and where it has already been adopted.

ai See Appendix 4 for Washington's Commute Trip Reduction program. A parallel program in New Jersey may require legislation, or could be done through NJDEP rulemaking that holds large employers accountable for CO_2 emissions based on the carbon dioxide's designation as a pollutant.

aj A study by the American Council for an Energy-Efficient Economy found that average fuel economy for cars and light trucks could be increased by 37 to70 percent with only a 4.3 to 6.6 percent increase in price. DeCicco, John, Feng An, Marc Ross. June 2001. Technical Options for Improving the Fuel Economy of US Cars and Light Trucks by 2010-2015. http://www.aceee.org/pubs/t012.htm

ak Governor Pataki's New York State Clean Fueled Vehicle Program transformed the State's total vehicle fleet from nearly zero clean vehicles to 43 percent alternative fueled-vehicles in 2006, saving more than 3.2 million gallons of petroleum in the last five years (for more information see http://www.ny.gov/governor/press/06/0919061.html).

al Leading by example also should include advocacy for federal policy changes. NJ is already involved in the legal proceedings against the US EPA regarding carbon dioxide emission but should further advocate for an increase in federal fuel economy standards for cars and light trucks to at least 40 miles per gallon within the next decade.

am See Appendix 5 for best practice models from other states and the UK on climate change mapping.

an See Appendix 5 for more information on and links to the Stern Review Report.

ao The benefits of tourism as an economic industry should be allowed to vary based on estimates of both the sales from tourism activities in that area of the coast and a quantification of the non-monetary benefit received by tourists from visiting that particular part of the coast. Benefits must be analyzed for particular locations, rather than the coast as a whole; so that areas such as Atlantic City or Cape May receive different consideration for beach protection priority than a beach barely accessible to tourists.

ap This analysis must be informed by a vulnerability analysis and assumptions provided by NJDEP staff, but can be conducted by consultants.

aq "Hard" protection measures include groins, dikes, bulkheads and sea walls. "Soft" protection measures include dune management strategies and beach nourishment. Gradual retreat from the most vulnerable areas refers to targeted managed retreat strategies using rolling easements, setbacks, transfers-of-development rights, land use laws that prohibit reconstruction, or a combination of these. All of these coastal protection strategies have different costs and levels of efficacy in protecting the NJ shore. That efficacy varies with the part of the shore is being protected—Atlantic City and Island Beach State Park, for example, should be protected in different ways to protect both economic assets and natural resources.

ar In the UK, 100 years is the planning horizon for shoreline management plans.

as Coastal management strategies include soft and hard protection, gradual retreat and status quo coastal management policies.

at "Areas" for the purpose of coastal management should be defined by NJDEP in consultation with municipal governments. The UK uses littoral "cells" as their equivalent management unit. (See Appendix 5 for more information.)

au The rolling easement recommendation refers to all intervening development as defined by CAFRA rules. Such development should be required to submit rolling conservation easements on the shore/tideland side of their property (parallel to the shoreline/tide line). These rolling easements would serve as a preventive measure to ensure that public access to beaches and public ownership of tidelands are not eliminated due to sea level rise.

av Ideally all easements already submitted by NJDEP's Division of Land Use Regulation that dedicate space for public access parallel to the shore (between the property and the mean high tide line) should be amended to become "rolling easements." This may require legislation in addition to rulemaking.

aw A longer description of rolling easements with links and a survey of gradual retreat programs of other states is given in Appendix 5.

ax For example, NJDEP transition areas for freshwater wetlands should be expanded if the agency determines that floodplains are indeed expanding due to climate change.

ay Here it is especially important that tidelands are allowed, to the extent possible, to migrate landward (as opposed to being impeded by a seawall or bulkhead) as would happen naturally in response to sea level rise.

az Eligibility for the program should be reserved primarily for those municipalities whose boundaries include substantial areas that are vulnerable to one or more climate change impacts.

ba Mitigation plans should include zoning provisions that require advanced flood damage control building designs along with other mitigation strategies for coastal erosion and wetlands protection.

bb These rules could be based on the work of the UK's Department of Environment, Food and Rural Affairs and development guidelines for flood defense from the British Insurance Agency. See Appendix 5 for further explanation.

bc Economic value estimation should rely on the cost-benefit analyses recommended earlier, but place more importance on the value of business and tourism in the area as opposed to property value in order to ensure the reconstruction is both logical and equitable.

bd Adaptation here refers to coastal management strategies for protecting new and reconstructed development from increasing coastal hazards.

be Species migration is already occurring as a result of warming and climate change may cause the extinction of endangered or threatened species that cannot migrate or otherwise adapt to warmer temperatures. Preserved corridors will help ensure that species can migrate if necessary. With or without corridors, invasive species that may hurt an ecosystem could become a problem for NJ as well as the rest of the world, given different abilities of animals to migrate and/or adapt to warmer temperatures.

bf Environmentally sensitive planning areas should help to bolster regulatory rules such as Wetlands Act buffers and special water resource protection areas (Category One waters buffers) by directing development away from those areas through municipal planning and state incentives tied to planning area designations. Category One waters receive special protection under Surface Water Quality Standards.

bg Non-profit groups and land trusts can augment municipal conservation efforts in "Dry Cities" by conserving land with the additional goal of mitigating climate change impacts on people and property by setting aside developed or developable lands that will be vulnerable in the future due to increasing erosion, coastal hazards and floodplain increases due to heavier stormwater flows.

bh Legislative examples are resolutions AJR92/SJR22 and AR146(1R).

bi Although it is essential that catastrophic storms be planned for, less-than-catastrophic storm events are more frequent and soon, due to sea level rise, will yield storm surge levels that would have resulted from only a catastrophic storm in the past. This consideration should also be taken into account.

bj See a list of state and municipal programs in Appendix 5.

bk See Appendix 5 for description of Massachusetts' re-insurance program.

bl Draft Energy Master Plan for New Jersey – Goal 1: Public Awareness and Education, October 13, 2006. http://nj.gov/emp/home/docs/pdf/061017.pdf.

bm See Appendix 6 for examples of awareness programs from other states.

bn NJDEP received a grant from US EPA for this purpose in 1997.

Action Steps by Agency

The New Jersey Department of Environmental Protection (NJDEP) will have the primary role in implementing a climate change mitigation and adaptation strategy. A successful statewide strategy, however, depends on full inter-agency involvement and cooperation. We have provided a checklist below, to provide guidance on the recommendations and initiatives requiring inter-agency assistance.

Department of Environmental Protection
Set a mandatory GHG emissions cap at 20 percent below 2006 levels by 2020 and a target of 80 percent below 1990 levels by 2050 (p.6)
Establish an inter-agency task force to coordinate a Climate Change Plan and a Stakeholder Advisory Council to provide input, and assist the Office of Economic Growth in establishing a Division of Cimate Change (p.6)
Establish an economy-wide cap-and-trade system (p.6)
Partner with NJBPU to auction 100 percent of emissions allowances under RGGI to increase funding for emissions reduction programs (p.7,11)
Coordinate with NJBPU to make emissions reduction targets an explicit objective of the Energy Master Plan (p.7)
Require the State to procure more clean advanced technology vehicles (p.13)
Advocate for increased federal vehicle fuel economy standards (p.13)
Produce vulnerability and economic impact reports evaluating various climate change scenarios (p.14)
Incorporate climate change impacts into short- and long-term coastal planning (p.15)
Encourage municipal adaptation planning through a "Dry Cities" program (p.16)
Protect natural resources from climate change impacts by preserving land strategically (p. 16)
Enhance storm preparedness through improved emergency management plans (p.17)
Partner with the insurance industry to develop a climate change risk management strategy (p.17)
Launch a statewide public awareness campaign on climate change (p.18)
Advocate for the continuation and expansion of climate change education in public schools (p.19)
Leverage resources to maximize funding for climate change education and outreach (p.19)

Department of Banking and Insurance
Support legislation requiring automobile insurers to offer pay-as-you-drive automobile insurance rewarding those who drive less (p.13)
Partner with NJDEP to develop a climate change risk management strategy (p.17)

Economic Development Authority
Assist NJDEP in developing a Stakeholder Advisory Council to obtain Climate Change Plan input (p.6)
Establish a Division of Clean Energy Technologies (p.8)
Focus explicitly on clean energy technology within the State's technology initiatives (p.8)
Partner with NJCST to create a business technology incubator for efficient and renewable energy (p.9)
Link state incentives to green building standards to stimulate demand (p.9)
Tie state incentive programs to efficiency gains to motivate developers (p.11)
Promote a "Powered by New Jersey Clean Tech" campaign (p.19)

Office of Economic Growth
Assist NJDEP in developing a Stakeholder Advisory Council to obtain Climate Change Plan input (p.6)
Establish a Division of Climate Change to develop, implement and monitor the Climate Change Plan (p.6)
Explicitly focus on clean energy technology within the State's technology initiatives (p.8)
Assist NJEDA and NJCST to create a business technology incubator focused on efficient and renewable energy (p.9)
Stimulate demand by linking state incentives to green building standards (p.9)
Support an "Energy Surcharge" on energy purchased by business and industrial users (p.10)
Make emissions reduction through reduced VMT an explicit Economic Growth Strategy goal (p.12)
Promote a "Powered by New Jersey Clean Tech" campaign (p.19)

Department of Education
Continue & expand environmental education in public schools (p.19)

Division of Consumer Affairs
Encourage the sale of energy-saving replacement tires, promote better vehicle maintenance and support pay-as-you-drive vehicle insurance (p.13)
Promote a "Powered by New Jersey Clean Tech" campaign (p.19)

Office of Emergency Management
Enhance storm preparedness through improved emergency management plans (p.17)

Governor's Office
Set a mandatory GHG emissions cap at 20 percent below 2006 levels by 2020 and a target of 80 percent below 1990 levels by 2050. Support legislation formalizing this cap and target into law (p.6)
Establish an inter-agency task force to coordinate a Climate Change Plan, an Office of Economic Growth Division of Climate Change to develop, implement and monitor the Plan and a Stakeholder Advisory Council to provide input (p.6)
Direct NJDEP to establish an economy-wide cap-and-trade system (p.6)
Direct NJDEP to auction 100 percent of emissions allowances under RGGI to increase funding for emissions reduction programs (p.7,11)
Direct NJBPU to make emissions reduction targets an explicit objective of the Energy Master Plan (p.7)
Expand the Director of Energy Savings' responsibilities to include assisting state entities develop and implement public, short- and long-term emissions reduction targets (p.7)
Initiate a "Cool States" coalition (p.7)
Convene a trans-Atlantic summit on climate change (p.7)
Establish an NJEDA Division of Clean Energy Technologies (p.8)
Focus explicitly on clean energy technology within the State's technology initiatives (p.8)
Support a business technology incubator for efficient and renewable energy (p.9)
Impose an "Energy Surcharge" on energy purchased by business and industrial users (p.10)
Promote a "Powered by New Jersey Clean Tech" campaign (p.10)
Make emissions reduction through reduced VMT an explicit Economic Growth Strategy goal (p.19)
Require the State to procure more clean advanced technology vehicles (p.12)
Advocate for increased federal vehicle fuel economy standards (p.13)

New Jersey Transit
Partner with NJDOT and NJOSG to encourage transit-friendly development (p.12)
Market the Smart Commute Initiative to encourage transit ridership among homebuyers (p.13)

Department of Labor and Workforce Development
Connect "green" jobs to workforce development programs (p.9)

Board of Public Utilities
Assist NJDEP in establishing an economy-wide cap-and-trade system (p.6)
Coordinate with NJDEP to make emissions reduction targets an explicit objective of the Energy Master Plan (p.7)
Partner with NJDEP to auction 100 percent of emissions allowances under RGGI to increase funding for emissions reduction programs (p.7,11)
Impose an "Energy Surcharge" on energy purchased by business and industrial users (p.10)
Partner with utilities to promote efficiency and conservation to households and businesses (p.11,19)
Maximize emissions reduction through "Demand-Side Management" of energy supply (p.11)
Increase funding for effective energy efficiency programs and ensure that funding targets cost-effective emissions reductions (p.11)
Expanding funding for the NJ Clean Cities Program (p.13)

Commission on Science and Technology
Establish a focus on clean energy technology within the State's technology initiatives (p.8)
Partner with NJEDA to create a business technology incubator for efficient and renewable energy (p.9)

Office of Smart Growth
Adopt policies that tie state incentives to efficiency gains in the State Development and Redevelopment Plan (p.11)
Make emissions reduction through reduced VMT an explicit State Development and Redevelopment Plan goal (p.12)
Partner with NJDOT and NJTransit to encourage transit-friendly development (p.12)
Encourage municipal adaptation planning through a "Dry Cities" program (p.16)
Adopt land preservation policies that encourage local governments to protect natural resources from climate change impacts (p.16)

Department of Transportation
Partner with NJTransit and NJOSG to encourage transit-friendly development (p.12)
Partner with NJTransit to encourage transit ridership and spread climate change awareness (p.13)
Increase automobile efficiency and encourage/require carpooling (p.13)

Image Sources

Cover (clockwise from top left) US Army Corps of Engineers. http://www.nan.usace.army.mil/business/prjlinks/coastal/sandy-hok/graphics/pumpingl.jpg New Jersey Dept. of Environmental Protection. http://www.state.nj.us/dep/dsr/njenv2000/title.jpg US National Park Services. http://www.nature.nps.gov/nnl/Registry/USA_Map/States/NewJersey/NNL/WH/images/William%20Hutcheson/NJ.jpg USDA Forest Service. http://www.na.fs.fed.us/highlands/photos/kent%20_087.jpg

p. 3 US Congressman Scott Garret. http://garrett.house.gov/UploadedPhotos/MediumResolution/906b240a-fa25-4b9a-8140-b7c6208a9d16.jpg CNN. http://i.cnn.net/cnn/2000/ALLPOLITICS/stories/11/07/senate.wrap/story.corzine.ap.jpg US Congressman Ed Case. http://wwwc.house.gov/case/images/capitol_bw.JPG

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Glossary

CAFRA	Coastal Area Facility Review Act
CCL	Climate Change Levy (a UK program)
CEP	Clean Energy Program
CHP	Combined Heat and Power
CO_2	Carbon Dioxide (the main Greenhouse Gas)
EE	Energy Efficiency
EERS	Energy Efficiency Resource Standard
EMP	Energy Master Plan (for New Jersey)
EPA	US Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GHG	Greenhouse Gas
GIS	Geographic Information Systems
HVAC	Heating, Ventilation and Air-Conditioning
KWh	Kilowatt-hour (a measure of electric power)
LEED	Leadership in Energy and Environmental Design
MLUL	Municipal Land Use Law
NJ	New Jersey
NJBPU	New Jersey Board of Public Utilities
NJCST	New Jersey Commission on Science and Technology
NJDEP	New Jersey Department of Environmental Protection
NJDOBI	New Jersey Department of Banking and Insurance
NJDOT	New Jersey Department of Transportation
NJEDA	New Jersey Economic Development Authority
NJOSG	New Jersey Office of Smart Growth
RGGI	Regional Greenhouse Gas Initiative
TDR	Transfer of Development Rights
TOD	Transit-Oriented Development
VMT	Vehicle Miles Traveled

Appendix 1: Leadership

Goal 1: Establish New Jersey as a model for state-level action and a national leader on climate change.

Action Step 1: Establish and implement a mandatory 2020 greenhouse gas (GHG) emissions cap and an ambitious 2050 emissions reduction target.

Announcing a target of 80 percent below 1990 levels by 2050 demonstrates climate change leadership on the East Coast and is equivalent to the target adopted by California. Although New Jersey's total emissions contribute only a small portion of world emissions, bold action by the Governor can spur other states to adopt similar measures. The Northeast and Mid-Atlantic states of New York, Maryland, Delaware, New Jersey, Massachusetts, Connecticut, Rhode Island, Maine, Vermont and New Hampshire together comprise the world's fourth largest economy with GHG emissions exceeding those of Germany. A coalition of states across the country actively limiting their emissions will create pressure for federal action. It is also essential that developed nations aggressively cut emissions to achieve their "fair share" of world reductions, given that some developing nations will increase emissions before they reduce them.

According to the Robert Watson, Chair of the Intergovernmental Panel on Climate Change (IPCC), global GHG emissions levels must be stabilized between 450 and 550 parts per million (ppm) carbon dioxide equivalent (CO_2e) over the next few decades[1] in order to reduce the probability of global average temperature rising more than two degrees, which would carry catastrophic climate change impacts.[2] The 2006 Stern Review[3] reported current levels at approximately 430 ppm CO_2e.[4] This increase in concentration compared with pre-industrial levels has already increased global temperatures by more than half a degree Celsius and will continue to cause another half degree rise over the next few decades. Under business-as-usual projections, global levels could reach 550 ppm CO_2e by as early as 2035, signifying an extremely high chance (77% - 99%) of a global average temperature rise exceeding two degrees.[5] Stabilization at 450 ppm, just 20 ppm above current levels, would still have a medium to high probability (46% - 86%) of exceeding the two degree threshold. According to new modeling by researchers at Stanford University, policymakers seeking a low risk (9% - 32%) of exceeding that threshold should enact policies that force global emissions to peak by 2010-2013 and then fall at 4-5 percent per year to about 70-80 percent below 1990 levels by 2050.[6] Any delay in taking action will cause climate change so drastic we will experience a "different planet"[7] and incur very high mitigation costs.[8] Therefore, any GHG emissions reductions by the State must be measured against this global benchmark.

Most states have adopted intermediate and long-term targets for emissions reductions (see Table 1.1). However, only one state, California, has adopted a mandatory emissions limit thus far. New Jersey's intermediate goal should be ambitious, based on an analysis of the trajectory needed to reach its 2050 goal and an estimate of economy-wide reductions achievable with strong top-down leadership and coordination among state agencies. A 2020 limit of 20 percent below current (2006) levels[9] is less ambitious than the targets adopted by six other Northeast states, but New Jersey faces a huge near-term challenge in reducing emissions from the transportation sector and would be bound by a legally binding system. The 2020 emissions limit is similar to that of California, which faces a similar challenge with transportation sector emissions. NJDEP should be able to revise the State's emissions cap in the future in line with scientific and technological developments. NJDEP should work with NJBPU and a technical contractor such as the Tellus Institute, which helped model and develop the targets for California, to estimate ambitious but appropriate near- and medium-term targets for New Jersey.

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1 Watson, RT. Climate Change: the Political Situation. Science. 12 December 2003: Vol. 302. no. 5652, pp. 1925 – 1926.

2 New research concluded that global warming of more than approximately one degree Celsius relative to 2000 will lead to dangerous climate change impacts on sea level and species extinction. See Hansen, J., M. Sato, R. Ruedy, K. Lo, D. Lea and M. Medina-Elizade. Global temperature change. Proceedings of the National Academy of Sciences of the United States of America (PNAS). 26 September, 2006: Vol. 103, no. 39, pp. 14288-14293.

3 HM Treasury. 2006 October 30. Stern Review on the Economics of Climate Change. http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm

4 This estimate includes 380 ppm of CO_2 and emissions from other types of GHGs.

5 Ibid HM Treasury.

6 Baer, P., M. Mastrandea. November 2006. High Stakes: Designing Emissions Pathways to Reduce the Risk of Dangerous Climate Change. Institute for Public Policy Research. http://www.ippr.org.

7 A 2-3 degree rise would cause rising sea levels, water scarcity for 2 billion people, increased flood risk, declining crop yields and 15-40 percent of species facing extinction. Source: Ibid HM Treasury.

8 Ibid HM Treasury.

9 A 20 percent below 2006 levels is roughly equivalent to slightly below 1990 levels.

Table 1.1 Examples of Climate Change Task Forces and Advisory Councils in Other States

Name	How Entity Was Created	State-Level Coordinator	Reporting Requi
Alaska Climate Impact Assessment Coalition – May 2006	Submitted and passed by the State Legislature as Bill HC30.	Chaired by member of the Legislature chosen by Coalition.	Report to the AK le
Arizona Climate Change Advisory Group – February 2005	Created by Executive Order.	Coordinated by the Arizona Department of Environmental Quality.	Inventory of GHG e Climate Change Act
California Climate Action Team – June 2005	Created by Executive Order S-3-05.	Coordinated by the Secretary of California Environmental Protection Agency.	Report to the Gove towards meeting G
Florida Energy Commission – June 2006	Created by bill passed in State Legislature.	Located in the Office of Legislative Services for administrative purposes.	Makes recommend first report by Dece
Montana Climate Change Advisory Committee – December 2005	The Governor issued a letter to the Montana Department of Environmental Quality.	Coordinated by the Montana Department of Environmental Quality.	Inventory of MT's G recommendations (
North Carolina Legislative Commission on Climate Change and Climate Action Plan Advisory Group (CAPAG) – September 2005	Established by the legislature to investigate broad goals, such as creating GHG targets for the state, to fact-find for the legislative commission and to make specific policy recommendations.	NC Department of Environment and National Resources (DENR) and Division of Air Quality (DAQ) will convene CAPAG.	Commission's final Final report of CAP
New Mexico Climate Change Action Council and Climate Change Advisory Group – June 2005	Executive Order mandated the Creation of the Action Council. The Advisory Group will present proposals to the Action Council to meet emissions targets.	Secretary of the Environment will chair the Action Council and will appoint and oversee the Advisory Group.	Final report of the The New Mexico En Governor July 1 of
Oregon Climate Change Integration Group – May 2006	Created by the Governor to continue and expand upon the work of the Climate Change Advisory Council.	Chaired by two scientists and supported by the Department of Energy staff and consultants.	Group will make its and follow with a m
Vermont Commission on Climate Change – December 2005	Created by Executive Order to inventory GHG emissions, educate the public and create Action Plan. VT Climate Change Advisory Group provides recommendations to Commission.	Department of Environmental Conservation will coordinate the Commission.	Commission will pre 2007.

rements	Membership
gislature March 1, 2007 and final report due January, 2008.	11 members, including two state senators, two state representatives, members of the public and scientific, tourism and resource development experts.
missions and sources in AZ by June 30, 2005. ion Plan by June 30, 2006.	36 members, including representatives from: electric power generation, fossil fuel industry, manufacturing, mining, agriculture, forestry, construction and building, tourism and recreation, heath care, non-governmental organizations, Indian tribes, state and local government and the general public.
rnor by June 1, 2006 and biannually after that on progress overnor's targets and climate change impacts.	Members are the Secretary of the Business, Transportation and Housing Agency, Secretary of the Department of Food and Agriculture, Secretary of the Resources Agency, Chairperson of the Air Resources Board, Chairperson of the Energy Commission and the President of the Public Utilities Commission
ations to the state Legislature on State Energy Plan. Must make ember 31, 2007 and each year after that.	Nine Members – including experts in energy, natural resource conservation, economic, engineering, finance, law, consumer protection and state energy policy. Commission may appoint staff, such as Executive Director.
GHG emissions from 1990 to 2020 and set of policy (Climate Change Action Plan) to the Governor by July 2007.	18 members representing a broad range of stakeholders including industry, environmental groups, local and tribal governments, transportation and agriculture.
report to the Legislature due November 1, 2006. AG due to DENR and DAQ by June 30, 2007.	34 members, 18 are representatives appointed by the Senate and House presidents, 16 are representatives of relevant business, environment and scientific interests.
Advisory Group to the Action Council due December 1, 2006. vironment Department will produce an annual report to the each year starting in 2007.	Members nclude the State Engineer, the Director of Game and Fish, the Secretaries of Agriculture, Economic Development, Energy, Minerals and Natural Resources, General Services, Health, Indian Affairs, Transportation and the Governor's Advisory on Energy and the Environment.
first recommendations to the Governor by December 30, 2006 ore comprehensive report due by December 2007.	Members will represent key sectors and a Staff Working Group will include representatives from: Energy, Forestry, Land Conservation and Development, Geology and Mineral Industries, Agriculture, Economic Development, Parks, State Lands, Fish and Wildlife, the Public Utility Commission, Department of Transportation, State Economist and Office of Emergency Management.
esent Climate Change Action Plan to the Governor by September	Six members of the Commission, including representatives from a university, the Burlington International Airport, the Real Estate community, the Vermont Natural Resources Council, a health care company and the Vermont Ski Areas Association.

Table 1.2 Statewide Targets

Region	By 2010 (unless otherwise stated)	By 2020 (unless otherwise stated)	By 2050 (unless otherwise stated)	Source
California (2005)	2000 levels (~11% below current levels)	1990 levels	80% below 1990 levels	California Executive Order S-3-05 and AB32
Arizona (2006)		2000 levels	50% below 2000 by 2040	Arizona Executive Order 2006-13
New Mexico (2005)	2000 levels by 2012	10% below 2000 levels	75% below 2000 levels	New Mexico Executive Order 05-033
Oregon (2004)	Stabilize	10% below 1990 levels	75% below 1990 levels	Oregon Strategy for Greenhouse Gas Reductions
Connecticut (2005)	1990 levels	10% below 1990 levels		Connecticut Climate Change Action Plan
Maine (2003)	1990 levels	10% below 1990 levels	75-80% below 2003 over the long-term	Maine LD 845 (HP 622)
Massachusetts (2004)	1990 levels	10% below 1990 levels	75-85% below 1990 over the long-term	Massachusetts Climate Protection Plan of 2004
New Hampshire (2006)	1990 levels	10% below 1990 levels	75-85% below 2001 over the long-term	New Hampshire Climate Change Challenge
New York (2002)	5% below 1990 levels	10% below 1990 levels		New York State Energy Plan of 2002
Rhode Island (2002)	1990 levels	10% below 1990 levels		Rhode Island Greenhouse Gas Action Plan
Vermont (2003)	25% below 1990 levels by 2012	50% below 1990 levels by 2028	75% below 1990 levels	Vermont Executive Order, September 13, 2003
New Jersey (1998)	3.5% below 1990 by 2005			New Jersey Administrative Order 1998-09

Appendix 2: Economic Development

Goal 2: Spur economic growth and workforce development through new clean energy technology markets created by climate change policy.

Action Step 1: Invest in and support efficient and renewable energy technology businesses.

New Jersey already has a number of policies to support clean technology and has significant industrial and infrastructure strengths. The New Jersey Commission for Science and Technology (NJCST) has identified materials & nanotechnology and energy generation as areas where the state has a competitive advantage. The tables below list examples of clean technology products and services, New Jersey's existing policies and programs and selected programs supporting clean technology in other states.

Table 2.1 Examples of Cleantech Products and Services

(Shaded boxes show areas in which NJCST identified New Jersey to have a competitive advantage.)

Cleantech Segment	Example Technologies
Agriculture & Nutrition	Bio-based materials; farm efficiency technologies; micro-irrigation systems; bioremediation; non-toxic cleaners and natural pesticides. Does not include organic, health food or natural health products.
Air Quality	Air purification products and air filtration systems, energy efficient HVAC; universal gas detectors; multi-pollutant controls; fuel additives to increase efficiency and reduce toxic emissions.
Enabling Technologies	Optical components, reactor technologies, catalysts and membranes with multiple applications; technology enabling the manufacture of nanoscale compositions; distributed sensor network technologies; power electronics, storage, cables and wires.
Environmental IT	Online exchanges for buying and selling resources; web-based software for Environment Health & Safety management; online environmental recordkeeping; operations management software for utility companies; software-enabled control systems for light emitting devices; wind source analysis and weather forecasting services.
Energy	*Energy Generation* Distributed and renewable energy generation and conversion (including fuel cells, geothermal, wind and solar/photovoltaics); gasification technologies for biomass; flywheel power systems.
	Energy Infrastructure Wireless networks to utilities for advanced metering, power quality monitoring and outage management; integrated electronic systems for the management of distributed power; demand response and energy management software.
	Energy Storage Batteries e.g. thin film, rechargeable; power quality regulation; flywheels; electro-textiles.
	Energy Efficiency Energy management systems; systems that improve output of power generating plants; intelligent metering; solid state micro-refrigeration; control technology for HVAC systems; automated energy conservation networks.
Materials and Nanotechnology	Biodegradable materials derived from seed proteins; micro-fluidics technology for conducting biochemical reactions; nanomaterials; composite materials; thermal regulating fibers and fabrics; environmentally-friendly solvents; nanotechnology components for electronics, sensor applications and energy storage; electro-chromic glass; thermoelectric materials.
Materials Recovery & Recycling	Recycling technologies; waste treatment; internet marketplace for materials; hazardous waste remediation; bio-mimetic technology for advance metals separation and extraction.
Manufacturing/ Industrial	Advanced packaging; natural chemistry; sensors; smart construction materials; business process and data flow mapping tools; precision manufacturing instruments & fault detectors; chemical management services.
Transportation & Logistics	Hybrid vehicle technology; lighter materials for cars; smart logistics software; car-sharing; temperature pressure sensors to improve transportation fuel efficiency; telecommuting.
Water Purification & Management	Water recycling and ultra-filtration systems (e.g. UV membrane & ion exchange systems); sensors and automation systems; water utility sub-metering technology desalination equipment.

Source: Burtis, P., B. Epstein, N. Parker. Creating Cleantech Clusters: 2006 Update: How Innovation and Investment Can Promote Job Growth and a Healthy Environment. May 2006. http://cleantech.com/index.cfm?pageSRC=Whitepapers.

Table 2.2 Policies and Programs in New Jersey Supporting Clean Energy Technology

Environmental Policies	Financial Assistance	Economic Development Services
• Regional Greenhouse Gas Initiative (reduces power sector CO_2 emissions starting in 2009) • Renewable Portfolio Standard (requires 22.5% of electricity come from renewable resources, including 2.12% from solar, by 2021) • Building Energy Codes • Energy Efficiency Product Standards • Energy Efficiency new school Construction • NJDEP Clean Cars Program (requires emissions reductions from new vehicles sold in-state starting in 2009)	• Rutgers Service-to-Industry Program (NJ small businesses may receive free laboratory and testing services) • NJCST Entrepreneurial Partnering Fund • NJCST Centers of Excellence (seeds centers such as a nanotechnology initiative in coordination with the Edison Innovation Fund) • NJEDA Technology Business Tax Certificate Transfer Program • Governor's Edison Innovation Fund • NJCST Technology Business Plan Competition (winners receive incubator space and small start-up grant) • NJCST Small Business Innovation Research (SBIR) Bridge Grant (funds companies awaiting Phase II of the federally funded SBIR grant) • Venture capital investment to attract/retain firms in New Jersey • NJBPU and NJEDA Clean Energy Financing & Assistance Programs • NJBPU Clean Energy Program (provides consumer/business incentives and rebates for energy efficiency and renewable energy measures) • NJBPU Alternative Vehicle Fuel Rebate Program	• Training for high-end technology workers and entrepreneurs (NJCST, tech industries and universities will develop curriculum for PhD and MBA programs) • NJCST Technology Fellowship Grant (funds recent doctoral graduates from NJ research universities to work in emerging high-tech companies) • NJCST Commercializing University IP Grants (to help accelerate technology commercialization) • NJEDA's Innovation Zones (i.e., Technology Centre of New Jersey in North Brunswick, Waterfront Technology Centre in Camden and a future Digital Century Building in Newark) • NJCST-supported Technology Business Incubators (12 currently) • NJCST Technology Business Incubator Feasibility Grants • NJCST Incubator Seed Fund (provides grants to incubating companies to commercialize technology) • NJBPU Clean Energy Conference and Leadership Awards

Action Step 2: Connect "green" jobs to workforce development programs in high-unemployment urban areas.

Designate the city of Newark as a "Green Gold" pilot city:

Governor Corzine's commitment to including low-income residents in the State's economic growth strategy can and should apply to a growth-oriented climate change policy. New Jersey's low-income urban residents bear the brunt of high energy prices and poor air quality, and are most hard-hit when new environmental standards impose additional costs. As the market for clean energy products and services grows, New Jersey's low-income urban residents should be in a position to benefit through expanded job opportunities, lower energy bills, and better quality of life. Focusing attention on how climate change policy can benefit low-income urban residents will also advance the state's revitalization goals, making urban centers greener, more attractive and more economically viable for all the state's residents.

A "Green Gold" pilot program in the city of Newark would demonstrate the viability of using growth-oriented climate change as an urban revitalization tool while providing concrete benefits to residents of the state's largest city. Benefits from the program would include public health improvements from better air quality, the cultivation of a skilled workforce able to serve the region in the rapidly growing clean energy sector, an increased number of high-performance, high-value public and private buildings, and an enhanced "green" public image. The pilot program would draw on the experience and talent of Newark's strong community and business organizations, including:

- New Jersey Institute for Social Justice (http://www.njisj.org/)

- New Community Corporation (http://www.newcommunity.org/)
- Ironbound Community Corporation (http://www.ironboundcc.org/)
- Newark Alliance (http://www.newark-alliance.org/)

"Priority 3) Promote sustainable growth with a particular emphasis on the State's cities and make strategic infrastructure investments to support economic growth while protecting the environment."

- New Jersey's Strategy for Economic Growth

The political momentum associated with the new mayoral administration, as well as the construction boom the city continues to experience, offer crucial windows of opportunity for pushing forward a "green building" policy that employs local workers and reduces energy costs for residents and businesses. The pilot program would also fit well with the goals laid out in the Regional Planning Association's recently published "Draft Vision for the City of Newark."[1]

The "Green Gold" pilot project would have three inter-related goals:

(1) Reducing energy costs for city residents and businesses;

(2) Supporting local demand for green building and clean energy options; and

(3) Training and placing local residents in green construction, installation, maintenance and repair jobs in the city and in the region.

To advance these three goals, the Climate Change Division, in collaboration with the State's Department of Labor and Workforce Development and with Newark city officials and community and business groups, would support the formation of a new entity: the **Newark Power Company**. The Company would begin as a non-profit, drawing on foundation funding and a small amount of seed money provided by the State. It would move toward financial self-sustainability by winning Energy Savings Performance Contracts (ESPC),[2] and by attracting long-term institutional investors and capital from entities that specialize in clean technology lending.[3]

A small staff would work with local organizations to map out a plan for meeting benchmarks associated with each of the three goals. They would then marshal all available federal, state and local as well as private resources to meet those benchmarks. Possibilities include:

- Linking the Comfort Partners Low Income Program at NJCEP with local workforce development programs, giving under and unemployed city residents marketable skills while providing discounted or free services to households in their communities that reduce their future energy bills;
- Working with local retail outlets to promote the sale of energy efficient appliances at discounted rates as part of the Energy Star Products program;
- Focusing resources on the installation of renewable energy micro-generation and distributed Combined Heat and Power systems in every building in the city where available resources can make the projects financially feasible. Installation and maintenance work would be performed via a first-source hiring contract with the Newark Power Company in collaboration with relevant union apprenticeship programs;
- A green roofs project to bring down building temperatures and provide locally-grown produce;
- Increased alternative fuel-based transit options and pedestrian-oriented planning;
- Training programs that focus on recruiting and retaining ex-offenders and at-risk youth for the growing green job market; and
- The possibility of building up "equity" shares in the Company and earning small dividends as they become available by participating in energy savings programs or by working on a Company project.

1 The Draft Vision Plan is available at: http://www.rpa.org/pdf/NewarkFinalReport.pdf

2 Energy Savings Performance Contracts (ESPC) obligate the service provider to perform work on a building that will result in substantial energy savings. The cost of the renovation work, plus a service fee, is paid out of this future savings stream. The customer than keeps the remainder of the money generated by the savings. For more information on ESPCs, visit http://www.epa.gov/oaintrnt/energy/espc.htm.

3 For example, the New Resources Bank, which specializes in financing renewable and energy efficiency projects (http://www.newresourcebank.com/index.php) and Capital-E, a group of financial experts in green investing (http://www.cap-e.com/mission/default.cfm).

Table 2.3 Selected Programs Supporting Clean Technology in Other States

California Solar Initiative (CSI)

In 2006, the California Public Utilities Commission committed $2.9 billion over 10 years to help install 3000 MW of new solar capacity, which is estimated to create 15,000 jobs over the life of the program. Legislation raised the cap on net metering during peak demand, which makes solar systems 25% cheaper by lowering system demand during peak loads. The bill also requires production homebuilders of home developments over 50 units to offer solar systems as a standard option.

Connecticut Clean Energy Fund (CCEF)

The Connecticut Clean Energy Fund (CCEF) was created in 1998 through a state electric restructuring legislation. CCEF, funded from surcharge on electric ratepayers' utility bills, invests in clean energy initiatives and enterprises. Due to the successful strategy of investing in emerging technology companies, Connecticut Innovations, Inc. (CI), a quasi-public organization that administers the fund, is self-funded. Two-thirds of CCEF's funds are invested in fuel cells; a $30 million fuel cell initiative has lead to construction of six fuel cell installations in the state.

Massachusetts' Renewable Energy Trust (RET)

Established in 1998 and funded by a small surcharge on ratepayers' utility bills, it operates a Green Buildings and Infrastructure Program, which includes a Green Affordable Housing Initiative, a Green Schools Initiative, a Large On-site Renewables Initiative and a Small Renewables Initiative; a Clean Energy Program, which includes Education and Outreach, tax deductions for green electricity purchases, financing for proposed renewable generation facilities from the sale of renewable energy certificates and predevelopment financial assistance for renewable energy facilities and an off-shore wind collaborative. RET funds clean energy technology manufacturers through venture capital investments and loans for companies undertaking new product development at the critical stage between R&D and commercialization.

New York State Energy Research and Development Authority (NYSERDA)

NYSERDA has recently launched a new program aimed at providing business assistance for renewable energy technology development and commercialization. The program will include business networks, incubators, competitive risk-sharing programs, access to consulting advice for business plans, funding strategies, partnering and technology commercialization strategies and funding up to $1 million available for companies to establish or expand manufacturing facilities.

Pennsylvania's Keystone Green Investment Strategy

In 2006, the state Treasury allocated $90 million towards promoting investment in clean technologies. This includes the Keystone Green Fund, a new investment fund to attract and leverage private sector investments in clean technology products and firms; Active Equity Management, which reallocates funds from existing investment managers to those who can demonstrate a track record of providing superior returns on their investments in clean technology stocks; Environmental Equity Screens, investment screens for all of its public equity investment managers to consult in assessing companies' potential loss from climate change, as well as changes in international energy economics and carbon regulation.

Texas' Clean Energy Incubator (CEI)

Launched in 2001 jointly by the Austin Technology Incubator (ATI) and the National Renewable Energy Laboratory (NREL), CEI provides training advice and consulting services, access to a network of investors and venture capitalists, technical expertise from ATI, the IC2 Institute and the University of Texas at Austin and office space. It does not have funds of its own to invest in companies. Since 2002, CEI has served 18 companies within the renewable energy and energy efficiency sectors, including areas such as geothermal, biofuels, wind energy and water conservation.

Appendix 3: Energy Efficiency

Goal 3: Boost energy efficiency gains through new incentives and regulatory measures and more funding and better targeting in existing State programs.

Action Step 1: Change business incentives through an energy use surcharge that lowers corporate taxes and reward energy-efficient businesses.

This action step is based on the Climate Change Levy (CCL) introduced in the United Kingdom in 2001, which has proven to be one of the most effective tools to lower greenhouse gas emissions. The CCL:

- Taxes energy delivered to corporate users, excluding energy produced by renewables or cogeneration.
- Exempts the transportation sector and residential users.
- Is revenue neutral: revenue is channeled back to industry through reductions in employer insurance contributions and funding for energy efficiency initiatives. Businesses are able to escape 80 percent of the levy by signing voluntary 'Climate Change Agreements' to reduce emissions.
- Is on track to reduce carbon emissions in the UK by 3.7 million metric tons per year by 2010 (more than six times the reductions achieved through building regulations), with associated measures saving a further 4.0 million metric tons, making a total of 7.7 million tons of carbon (22 million tons of CO_2).

An equivalent reduction in New Jersey's emissions would be about 4-5 million tons of CO_2 (by comparison, in 2004 the NJ Clean Energy saved 287,000 metric tons of CO_2).

A similar levy/fee in New Jersey, with revenues used to reduce taxes paid for employees, would build on the current campaign to encourage New Jersey residents to work in the Garden State. Reduced taxes paid for employees translate into lower costs for employers and higher wages for employees. Innovative tax reform like an energy use surcharge would make New Jersey a national leader on climate change while creating and maintaining jobs for New Jersey residents.

Action Step 2: Motivate households through increased promotion of energy-efficient equipment – explore linking property tax relief to energy efficiency gains.

New Jersey faces an ongoing struggle to reduce its high property tax burden and has several programs dedicating other tax revenues (including from state income taxes and portions of the state sales tax) to property tax relief through State rebates to households. The State legislature is in the process of considering a 98-point plan for further property tax relief. Because property taxes are such a burden on the state's economy and command such intense public attention, State property tax relief may serve as a compelling vehicle for promoting energy efficiency programs.

As with all other energy programs, this proposal has a potentially harmful regressive impact on low-income households and must be structured so that these households are shielded from additional costs.

Table 3.1 Examples of Property Tax Incentive Programs in Other States

State	Program Description
Maryland	An optional corporate property tax credit that counties (the local taxing jurisdiction) can choose to make available to businesses that purchase renewable energy technology or qualifying energy conservation devices for heating and cooling. Counties determine the amount of the credit and the length of time for which it is available up to a limit of three years.
Nevada	A June 2005 provision authorizes a partial property tax abatement for buildings that meet or exceed Silver LEED standards. The abatement cannot be greater than 50% of property taxes due and cannot continue for longer than 10 years. To apply, buildings must receive a letter of verification from the Director of the Nevada State Office of Energy.
New York	Residential buildings (single to four-family dwellings) are exempt from added property tax due to improvements related to energy conservation measures. Qualifying improvements include: Equipment Insulation, Furnaces, Boilers, Heat pumps, Programmable Thermostats, Energy Mgmt. Systems/Building Controls, Caulking/Weather-stripping, Duct/Air sealing, Building Insulation, Windows, Doors.

Source: Database for State Incentives in Renewable Energy, http://www.dsireusa.org/

Action Step 5: Increase funding for effective State energy efficiency programs, and ensure that funding targets cost-effective GHG emissions reductions.

New Jersey's Clean Energy Program (CEP) promotes many effective technologies for reducing GHG emissions and conducts careful analyses about the environmental impact and cost-effectiveness of each program. However, due to a variety of factors, including important equity goals such as protecting low-income residents from energy cost burdens, funding allocation decisions at the CEP are not based solely on environmental impact analysis. Budgetary decisions are made in consultation with a stakeholder-driven Clean Energy Council, and GHG emission reduction is only one of several competing priorities.

The CEP could "buy" more emissions reductions without increasing its budget by simply re-organizing the funds already spent to give greater priority to programs that provide the most cost-effective GHG emissions reductions. In order to protect funding for important CEP programs that do not deliver cost-effective GHG emission reductions (for example, the Comfort Partners Low Income Program), most of the new funding targeted at cost-effective technologies for GHG emission reduction should come from a 100 percent auction of RGGI allowances rather than from the current CEP budget.

Based on figures published in the NJCEP 2005 Annual Report, the most cost-effective program from the point of view of emissions reductions in 2005 was the Commercial and Industrial Retrofit program, followed by the Energy Star Products program. One of the least cost-effective was the Customer On-site Renewable Energy program (CORE) that offers rebates for solar panel installation. Despite this, CORE was funded at over four times the rate of C&I retrofits and the Clean Energy Council. (NJCEP is moving toward a tradable credits system for the CORE program which will help bring down costs associated with this program, eventually moving to an entirely market-based system.)

The analysis presented below suggests that future funding decisions should make cost-efficient emissions reductions a higher priority, while protecting programs targeted at low-income residents.

It is important to note that the CEP should not "pick" a particular winning technology, but instead should continue to evaluate each technology and prioritize whichever one demonstrates the most cost-efficient emissions reducing capacity. The "winning" technology will change over time. On-going evaluation is critical to the success of this recommendation.

Table 3.2 Cost-Effectiveness Analysis of the New Jersey Clean Energy Program

Program	MWh* Saved	Actual Expenses	Budget	Pounds CO_2 Saved	Pounds CO_2 Saved Per Dollar Spent	Dollars Spent Per Pound CO_2 Saved
C&I Retrofit	260,238	$17,347,000	$20,900,000	395,561,760	22.80	$0.04
NJ Energy Star Products	63,509	$5,973,000	$6,830,000	96,533,680	16.16	$0.06
New School Construction and Retrofit	13,583	$3,360,000	$3,500,000	20,646,160	6.14	$0.16
C&I New Construction	13,851	$3,730,000	$3,300,000	21,053,520	5.64	$0.18
NJ Cool Cities Program	4,118	$2,572,000	$4,000,000	6,259,360	2.43	$0.41
Combined Heat and Power**	767	$502,000	$7,750,000	1,165,840	2.32	$0.43
CORE	16,620	$29,850,000	$85,700,000	25,262,400	0.85	$1.18
Comfort Partners Low-Income Program	5,636	$15,467,000	$21,235,000	8,566,720	0.55	$1.81

Source: MWh, Expense, and Budget information taken from New Jersey's Clean Energy Program 2005 Annual Report, (http://www.njcleanenergy.com/html/5library/pdf/NJCEP2005AR-r1.pdf)

"Pounds CO_2 Saved" based on NJDEP factor of 1,520 lbs CO_2/MWh saved (September 2004 report on Clean Energy Protocols, p. 9 - http://www.njcleanenergy.com/media/Protocols.pdf)

* A megawatt hour (MWh) is the amount of electricity generated by a one megawatt electric generator operating for one hour. One MWh is equivalent to 1,000 kilowatt-hours (kWh).

** A study conducted on behalf of the City of London to assess which technology would be the most effective in meeting a desired CO_2 emission reduction target by 2026 found that Combined Heat and Power (CHP) was the most effective strategy, in fact the only strategy that showed a positive net present value (NPV) over the term studied. The results of the London analysis are reproduced below.

Figure 3.1 Pounds of CO_2 Avoided Per Dollar Spent and Budget Allocation, by New Jersey Clean Energy Program - 2005

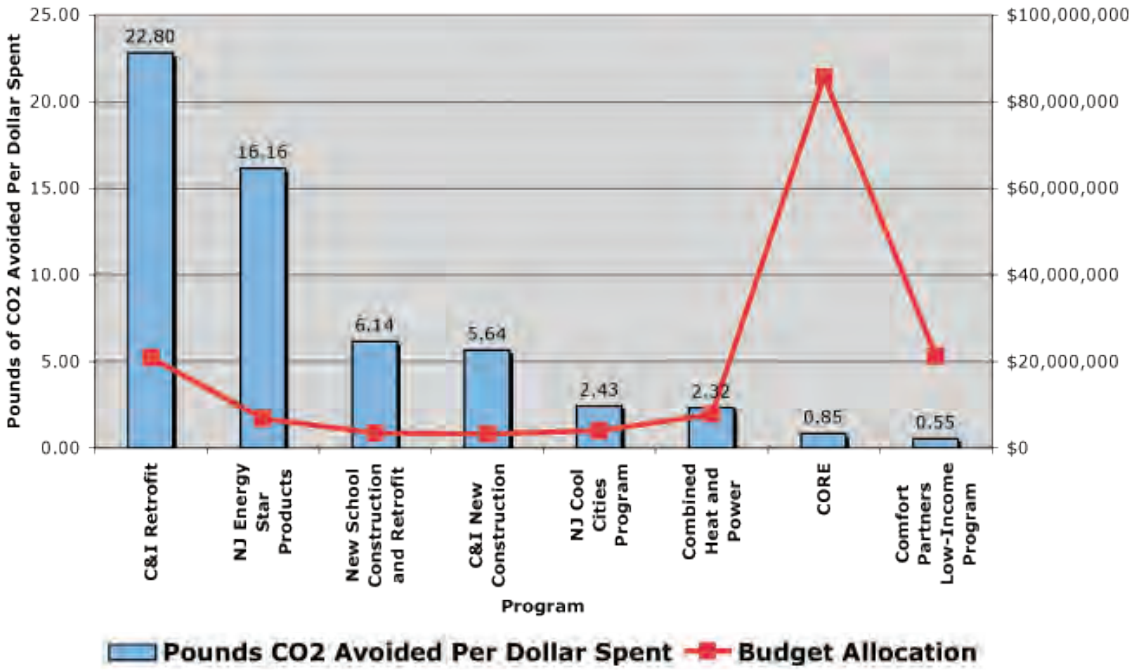


Table 3.3 Summary of Results for the City of London Carbon Scenarios

Scenarios	Description	Heat	Power	CO_2 Savings	Capital Cost	NPV
		GWh/y	GWh/y	ktpa	£m	£m
Scenario 1	Large CHP	30,296	23,587	10,442	8,392	1,192
Scenario 2	Building & micro CHP	58,478	22,799	10,285	7,455	-531
Scenario 3	Renewables	21,852	13,380	10,414	14,591	-4,237
Scenario 4	Insulation	38,177	14,526	10,362	10,797	-1,429
Scenario 5	Hybrid	29,843	18,184	10,344	8,427	678

Source: London Carbon Scenarios to 2026," prepared by SEA/RENUE on behalf of the London Energy Partnership, March 2006, pp ii-iii.

Figure 3.2 Capital Costs and NPV for the Different Scenarios

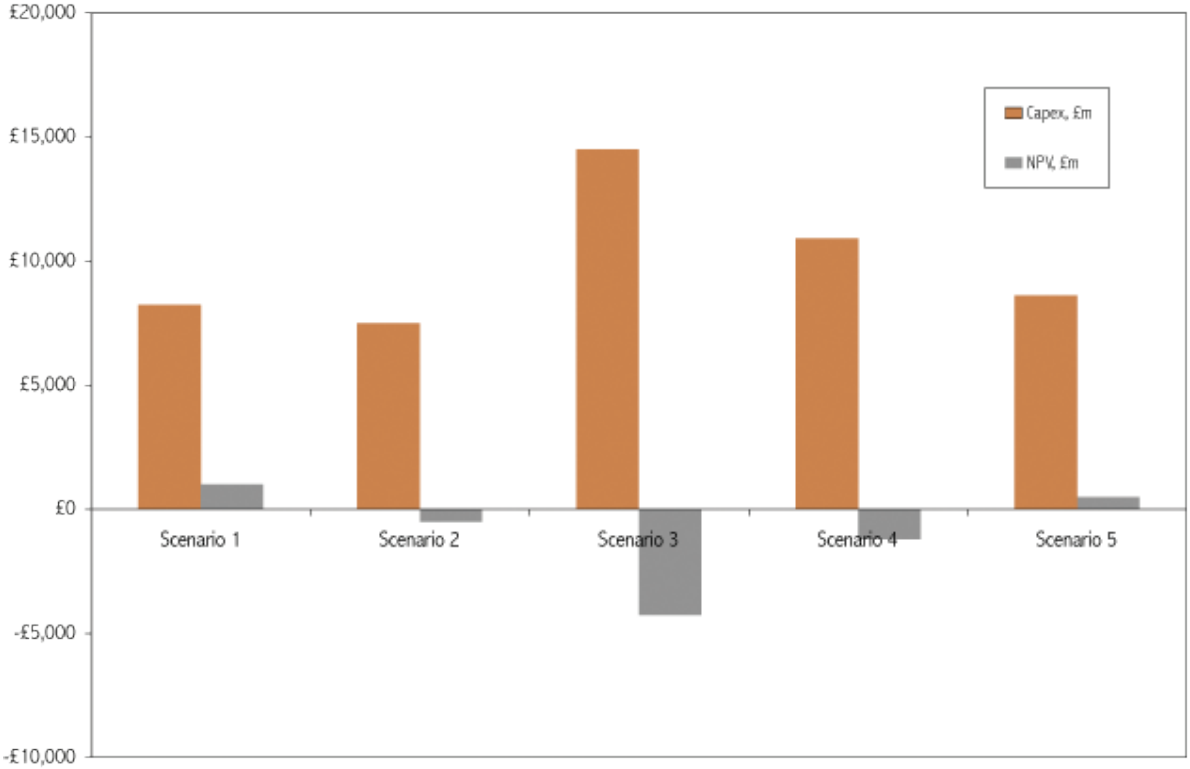


Table 3.4 New Jersey Current Incentive and Regulatory Programs

Program Name	Incentive Type	Website
Financial Incentives		
Combined Heat & Power (CHP) Program	Rebate	http://www.njcleanenergy.com/ html/Combined/incentives.html
COOLAdvantage Program	Rebate	http://www.njcleanenergy.com/ html/1residential/1_cool_ advantage.html
ENERGY STAR Homes Program	Rebate	http://www.njenergystarhomes.com/ index.html
Home Performance with Energy Star Loan Program	Loan	http://www.mynjenergystar.com/ index.html
New Jersey Clean Energy Rebate Program	Rebate	http://www.njcep.com/html/ 2_incent.html
NJ Board of Public Utilities - Solar Renewable Energy Certificates (SRECs)	Production Incentive	http://www.njcep.com/srec
Renewable Energy Business Venture Assistance Program (REBVAP)	Grant	http://www.njcleanenergy.com/html/Combined/cleanenergy_ financing.html
Solar and Wind Energy Systems Exemption	Sales Tax Exemption	
South Jersey Gas - Residential Loan Program	Utility Loan	http://www.sjindustries.com/sjg/switch/rebates.html
Sustainable Development Loan Fund	Loan	
WARMAdvantage Program	Rebate	http://www.njcleanenergy.com/html/1residential/2_warm_ advantage.html
Rules, Regulations and Policies		

Energy Efficiency in New School Construction	Energy Standards for Public Buildings	http://www.njscc.com/Main/index.asp
Energy Efficiency Product Standards	Appliance/Equipment Efficiency Standards	http://www.njpirg.org/NJ.asp?id2=8921&id3=NJ&
Environmental Information Disclosure	Generation Disclosure	http://www.state.nj.us/bpu/home/energy.shtml
Interconnection Standards	Interconnection	http://www.state.nj.us/bpu/home/secDiv.shtml
New Jersey - Green Power Purchasing	Green Power Purchasing/ Aggregation	http://www.state.nj.us/dep/dsr/bscit/CleanEnergyMain.htm
New Jersey - Net Metering	Net Metering Rules	http://www.state.nj.us/bpu/home/secDiv.shtml
New Jersey Building Energy Code	Building Energy Code	http://www.bcap-energy.org/state_status.php?state_ab=NJ
Renewables Portfolio Standard	Renewables Portfolio Standard	http://www.state.nj.us/bpu/home/energy.shtml
Societal Benefits Charge	Public Benefits Fund	http://www.bpu.state.nj.us/
Federal Incentives		
Business Energy Tax Credit	Corporate Tax Credit	http://www.irs.gov/pub/irs-pdf/f3468.pdf
Energy Efficient Appliance Tax Credit for Manufacturers	Corporate Tax Credit	
Energy Efficient Commercial Buildings Tax Deduction	Corporate Deduction	
Energy Efficient Mortgage	Loan	http://www.natresnet.org/lender/default.htm
Modified Accelerated Cost-Recovery System (MACRS)	Corporate Depreciation	
New Energy-Efficient Home Tax Credit for Builders	Corporate Tax Credit	http://www.irs.gov/newsroom/article/0,,id=154658,00.html
Renewable Electricity Production Tax Credit	Corporate Tax Credit	http://www.irs.gov/pub/irs-pdf/f8835.pdf
Renewable Energy Production Incentive (REPI)	Production Incentive	http://www.eere.energy.gov/wip/program/repi.html
Residential Energy Conservation Subsidy Exclusion	Corporate and Personal Exemption	http://www.irs.gov/publications/p525/index.html
Residential Energy Efficiency Tax Credit	Personal Tax Credit	http://www.irs.gov/newsroom/article/0,,id=154657,00.html
Residential Solar and Fuel Cell Tax Credit	Personal Tax Credit	http://www.dsireusa.org/documents/Incentives/US37F.pdf
Tribal Energy Program Grant	Grant	http://www.eere.energy.gov/tribalenergy/financial.html
USDA Renewable Energy Systems and Energy Efficiency Improvements Program	Grant	http://www.rurdev.usda.gov/va/programs/RBS/renewenergy.htm
Veterans Housing Guaranteed and Insured Loans	Loan	http://www.federalgrantswire.com/veterans_housingguaranteed_and_insured_loans.html
Federal Rules, Regulations & Policies		
Energy Goals and Standards for Federal Buildings	Energy Standards for Public Buildings	http://www1.eere.energy.gov/femp/about/legislation_epact_05.html
Federal Appliance Standards	Appliance/Equipment Efficiency Standards	
Federal Government - Green Power Purchasing Goal	Green Power Purchasing/ Aggregation	http://www.dsireusa.org/documents/Incentives/US01Ra2.htm

Source: Database for State Incentives in Renewable Energy, http://www.dsireusa.org/

Appendix 4: Transportation

Goal 4: Make transportation more efficient and development smarter.

Action Step 1: Encourage a reduction in Vehicle Miles Traveled (VMT) by revising State planning documents and promoting transit-oriented development.

Table 4.1 Pay-As-You-Drive (PAYD) Insurance Programs

Program	Description	Website
North Central Texas Pilot Project	This pilot is quantifying reductions in vehicle mileage and emissions and other changes in driver behavior, resulting from PAYD insurance pricing. The Regional Transportation Council (RTC) is partnering with an insurance company to offer a mileage-based insurance plan to a certain number of vehicle owners within the region.	http://www.dfwcleanair.com/trans/payd.html
Oregon	Oregon passed legislation in 2003 to encourage insurers—through a $100 per policy tax credit—to offer pay-as-you-drive insurance. The Oregon Environment Council is seeking an insurance partner for a 24-month trial of PAYD and building a database of consumers interested in PAYD.	http://www.oeconline.org
Washington	Groups including King County Metro, Seattle City Light and Olympia's Climate Solutions are interested in partnering with an insurer to test pay-as-you-drive in Washington. Metro is interested in marketing PAYD to its 150,000 rideshare program participants and bus pass holders.	http://www.climatesolutions.org
General Motors and On-Star (US)	Since mid-2004 the General Motors Acceptance Corporation (GMAC) Insurance has offered mileage-based discounts to OnStar subscribers located in certain states. The system automatically reports vehicle odometer reading at the beginning and end of the policy term to verify vehicle mileage. Motorist who drive less than specified annual mileage receive insurance premium discounts of up to 40%.	http://www.onstargm.com/promo/html/promo_mileage.htm
Progressive and Aviva Programs (Minnesota and Ontario)	The Progressive TripSense program in Minnesota and AVIVA Autograph program in Ontario offer vehicle insurance discounts up to 25%, based on how much a vehicle is driven. Participating drivers receive a TripSensor, a free, matchbox-sized device that plugs into a vehicle's On-Board Diagnostic (OBDII) port. The TripSensor records how much, how fast and when the vehicle is driven. This information is used to calculate discounts the customer may receive when they renew their policy.	https://tripsense.progressive.com https://secure.avivacanada.com/autograph/product.php
Norwich-Union PAYD Pilot Project (United Kingdom)	In 2003, Norwich-Union, the largest insurance group in the UK, began a two-year pilot project of PAYD insurance pricing involving about 5,000 vehicles. Each participating vehicle is fitted with a small data recorder which measures vehicle usage and automatically reports mileage using mobile telephone technology.	http://www.norwichunion.com/pay_as_you_drive/index.htm?plp_ci_payd
Aryeh Insurance (Israel)	PAYD premiums are billed monthly using mileage data collected by small wireless transmitters in vehicles and receivers at fuel pumps, offered by PAZ (http://www.pazomat.co.il), the country's largest petroleum company. About 200,000 vehicles (about 15% of all vehicles and a larger portion of company and government agency cars) already have the device installed for automatic payment.	http://www.aryeh.co.il
Polis Direct Kilometre Policy (Netherlands)	This major Dutch insurance company offers per-kilometer premiums calculated by dividing current premiums by the current policy's maximum annual kilometers. At the end of the policy term, motorists can receive a rebate of up to 50% of their premium for lower mileage, or pay up to 50% higher premiums if they drive more than the current maximum. Mileage data is collected during annual vehicle inspections, called the "national car card," and recorded in the national vehicle registration database.	http://www.kilometerpolis.nl
PAY PER K Coverage (South Africa)	Nedbank, a major South African insurer, offers Pay-Per-K vehicle insurance. Monthly premiums are based on the distance traveled in the preceding month and are debited monthly in arrears. Mileage is automatically recorded each time the vehicle is refueled using a Nedbank card.	

Under a Pay-As-You-Drive (PAYD) Vehicle Insurance (also called Distance-Based Vehicle Insurance, Mileage-Based Insurance, Per-Mile Premiums and Insurance Variabilization), insurance premiums are based on how much a vehicle is driven during the policy term. Those who drive less pay a lower premium. Existing rating factors are also incorporated so that higher-risk drivers pay more per mile than lower-risk drivers. This type of insurance can also be an optional part of the package. It may particularly benefit lower-income motorists who drive their vehicles significantly less on average than higher-income motorists. PAYD insurance will require insurers to change the way fees are calculated and hire a network of odometer readers. For more information on how this type of insurance works, see http://www.vtpi.org/tdm/tdm79.htm.

Also see http://www.sightline.org/research/sust_toolkit/solutions/payd for list of benefits and description of efforts and pilots in the Northwest, Texas and Europe (UK Norwich Union http://www.norwichunion.com/pay-as-you-drive/).

Table 4.2 Model VMT Reduction Programs From Around the Country

Program	Location	Description	Website
GoMaine Commuter Connections	Maine	The Maine Department of Transportation and the Maine Turnpike Authority provides a free commuter matching service. Registered commuters receive an Emergency Ride Home Guarantee. The site also offers "21 Easy Fuel-Wise Tips" for drivers.	http://www.gomaine.org/carpool/index.html
New Hampshire Rideshare	New Hampshire	The New Hampshire Department of Transportation provides a free commuter matching service. It is also working with the Regional Planning Commission and employers to encourage ridesharing and implement a statewide ridesharing system.	http://www.nh.gov/dot/nhrideshare/
Ride Matching	Washington	The Washington State Department of Transportation provides links to ride matching services for various counties around the state.	http://www.wsdot.wa.gov/choices/rideshare.cfm
Van-Go Commuter Vanpool Program	Minneapolis St. Paul, MN	The Metropolitan Council organizes vanpools with volunteer drivers for residents of the Twin Cities area.	http://www.metrocouncil.org/planning/transportation/vango/vango.htm
Guaranteed Ride Home	Minneapolis St. Paul, MN	MetroTransit offers registered commuters who ride the bus or train, carpool, vanpool, bike or walk at least three days a week to work or school two coupons every six months for bus, train or cab fare up to $25.	http://www.metrotransit.org/riderPrograms/grh.asp
Slug-Lines	Washington, DC	A free 'casual carpooling' service created by local residents in which drivers pick up other commuters at designated spots to meet the 3-person high occupancy vehicle lane requirement.	http://www.slug-lines.com
Spare the Air	San Francisco, CA	The Spare the Air Program was established by the Bay Area Air Quality Management District to educate people about air pollution and to encourage them to change their behavior to prevent it. When the morning forecast predicts unhealthy PM concentrations, Bay Area residents are urged to Spare the Air by refraining from burning wood, by taking public transportation and by trip-linking any necessary errands. The site provides answers to frequently asked questions about air pollution, descriptions of its health effects, information about how various communities and employers are working to prevent pollution, clean air tips and a variety of other educational resources. Advisories are sent to subscribers of Air Alerts and to companies in the Employer Network.	http://www.sparetheair.org
Commute Trip Reduction Program	Washington	The State's Commute Trip Reduction (CTR) Law seeks to reduce traffic congestion, reduce air pollution and petroleum consumption through employer-based programs that decrease the number of single commuter trips. The Law requires the nine most populous counties to adopt CTR ordinances and support local employers in implementing CTR. Employers with 100 or more full-time employees at a single worksite who begin their scheduled workday between 6 and 9 am are required to develop a CTR program. Employers may offer benefits such as subsidies for transit fares, flexible work schedules and telecommuting opportunities.	http://www.wsdot.wa.gov/tdm/program_summaries/ctr_summ.cfm
Emery Go Round	Emeryville, CA	Free shuttles in Emeryville provide transfer service for commuters between popular spots (i.e., shopping centers) around the city and nearby Bay Area Rapid Transit (BART) stations.	http://www.emerygoround.com/

Appendix 5: Adaptation

Goal 5: Improve State preparedness to cope with sea level rise and increased frequency and intensity of storms.

Action Step 1: Produce vulnerability and economic impact reports evaluating various climate change scenarios.

New Jersey should look to the adaptation section of the UK's Stern Review Report as an example of an effective cost-benefit analysis on the impacts of climate change and adaptation. The Report has received tremendous publicity precisely because it relays the message of climate change in monetary terms. New Jersey should also look to the UK Climate Impacts Programme as an example of how to effectively relay the costs and benefits of adaptation to organizations "on the ground." This Program has set up a free, web-based tool called the Adaptation Wizard that helps organizations decide whether or not it is in their economic interest to pursue an adaptation strategy. This Adaptation Wizard allows organizations to (1) scope the impact climate change will have on their business, (2) quantify the risks they face, (3) help them in their decision-making and (4) review adaptation strategies (Stern Report, 419).

Adaptation Wizard: http://www.ukcip.org.uk/resources/tools/adapt.asp.

Stern Review: http://www.hmtreasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm

Figure 5.1 An illustration of Costs Saved From Adapting to Climate Change Impacts such as Increasing Coastal Hazards.

Source: Stern Review Report, p.405.
http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm

For help with what to include in and how to conduct the cost benefit analysis, New Jersey should look to the Massachusetts Coastal Hazards Commission Draft Recommendations, which call for:

1. Regional Sand Management Study
2. Sediment Source Study for Beach and Dune Nourishment
3. Beneficial Re-Use of Dredged Material

Refer to: http://www.mass.gov/czm//chc/recommendations/recommendations.htm

Data Sources:

Data collection will require some increases in NJDEP's budget. Much of the sea level rise data is already available from researchers[1] and the EPA and most if not all of the other vulnerability variables are mapped by the Census and with GIS data available for public use. NJOSG has available GIS layers related to land use planning and may be able to secure data from some individual municipalities. NJDEP has GIS data on many of the geologic characteristics of coastal areas and floodplains that will need to be integrated with the vulnerability variable GIS layers in the vulnerability mapping.

[1] Cooper, Matthew J.P., Michael D. Beevers and Michael Oppenheimer. "Future Sea Level Rise and the New Jersey Coast: Assessing Potential Impacts and Opportunities." Princeton University, Woodrow Wilson School of Public and International Affairs, Science, Technology and Environmental Policy Program. November 2005.
http://region.princeton.edu/pub_detail_23.html

Table 5.1 Models for Conducting and Mapping Vulnerability Assessment

Country	Program Description	Comments
Netherlands	Dynamic Interactive Vulnerability Assessment Tool http://diva.demis.nl/ Potsdam Institute for Climate Research	Software system that assesses the biophysical and socioeconomic impacts of climate change and quantifies the costs of adaptation. Covers all coastal nations.
UK	UK Climate Change Impacts Programme: 'The Adaptation Wizard' http://www.ukcip.org.uk/resources/tools/adapt.asp	See economic impact report appendix.
USA: USGS	Light Detection and Ranging data (LIDAR) and dynamic coastal geomorphic modeling may be very useful to the development of these vulnerability maps. Currently LIDAR and geomorphic modeling by USGS is already mapping current and future vulnerability of coastal areas to erosion, inundation and storm flooding.	
USA: Hawaii	Erosion hazard maps on Maui Planning Commission http://www.soest.hawaii.edu/coasts/data/maui/index.html	

Amongst these are government agencies and authorities like the Office of Smart Growth, Department of Transportation and the Port Authority; academics in environmental sciences, geography, planning and engineering from State and private universities; and business organizations like the insurance, banking and construction associations.

Action Step 2: Incorporate climate change impacts into short- and long-term plans for the coast.

Create short-, medium- and long-term management plans.

Figure 5.2 Example from one of United Kingdom's Shoreline Management Plans

A model from the UK for long-term coastal management, Shoreline Management Plans:

G1.1 SHORELINE RESPONSE ASSESSMENT

For each Policy Unit the preferred policy together with the assumed broad-level implementation is outlined in the shaded boxes.

SCENARIO REF: PREFERRED PLAN			
Location	Predicted Change for		
	From Present Day	Medium Term	Long Term
3b01 Kelling Hard to Sheringham	Allow shoreline retreat through no active intervention	Allow shoreline retreat through no active intervention	Allow shoreline retreat through no active intervention
	Cliff erosion will continue at similar rates to those experienced historically, with a net retreat of the cliff line of between 5 and 10m by year 2025. As the cliffs erode this will contribute some beach- building sediment (mainly sand), which will maintain beach at the toe of the cliffs, but there will be little other input of shingle to this frontage from alongshore due to the low sediment transport rates. Similarly there will be low transport from this area both to the east and west. There will be a slight beach build-up at the eastern end due to the defences at Sheringham; therefore cliff erosion may be slightly less at this end. As the shingle ridge rolls back the existing short length of palisade will become exposed and local flood defence works could be implemented in a set back position, without impacting upon coastal processes	Cliff erosion will continue at an increased rate due to sea level rise, with a net change in cliff line position of between 15 and 30m by 2055. The cliffs will supply both sand and shingle to the beach, but under the increased energy conditions this volume may not be sufficient to build beaches, therefore the beaches are expected to narrow. .At Weybourne, the shingle ridge will be allowed to retreat in line with the cliffs, but there will be a risk of breach with localised flooding of the small area of low-lying land behind.	It is likely that a beach will remain at the foot of the cliffs, but it is likely that this will be narrower than at present, unless the cliffs are able to keep pace with the rate of sea level rise. It is expected that a shingle barrier will remain at Weybourne, albeit one that is frequently overtopped and breached. There will therefore be frequent flooding of the localised low-lying area behind. There will be continued cliff erosion and shoreline retreat, accelerated by sea level rise, with a net change in cliff line position of 40 to 55m by 2105.
3b02 Sheringham	Hold the line, through maintaining (and extending) existing seawall, rock revetment and groynes.	Hold the line, through maintaining, replacing (and, if necessary, upgrading) existing seawall, rock revetment and groynes.	Hold the line, through maintaining, replacing and upgrading seawall structures.

Source: Anglian Coastal Authorities Group, http://www.northnorfolk.org/acag/default_smp.asp

The United Kingdom has moved to regional shoreline management that splits the shore into units based on littoral cells. Each region is responsible for deciding its own coastal management strategies and local and regional governments must approve the plan before the federal government gives funding for shoreline protection. Currently the plans are in dispute because the federal government has not agreed to compensate property owners for damages as a result of sea level rise. However, the shoreline management plans are novel in their combination of both short- and long-term strategies, planning for 100 years into the future. For more information on the program, see http://www.defra.gov.uk/environ/fcd/policy/smp.htm

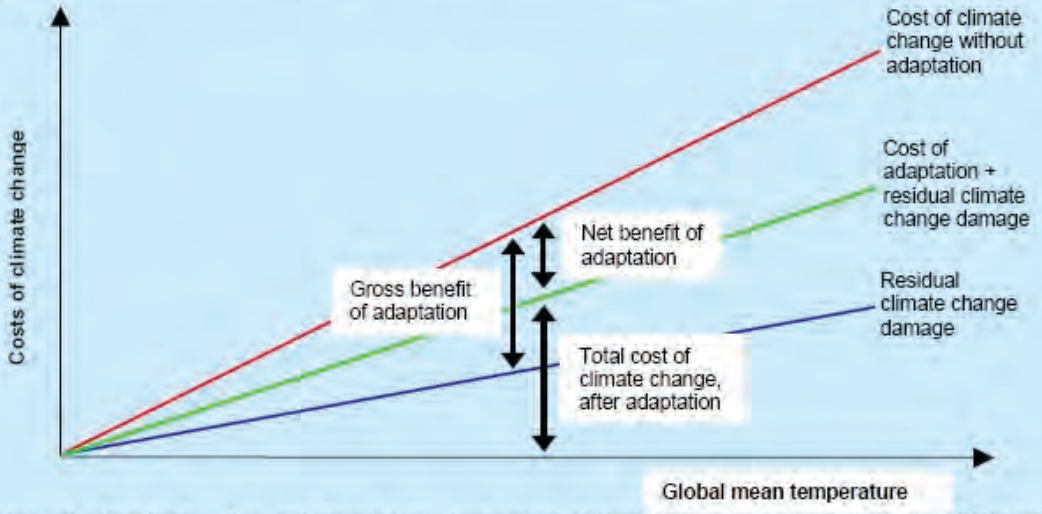
NJDEP should prepare for the possibility of long-term retreat from targeted low-lying areas:

Rolling Easements: Because the entire coast of New Jersey is developed, sea level rise should be expected to inhibit public access to tidal lands. Even a small amount of sea level rise will eliminate much public access to any wet beach that does not receive beach nourishment and any tidal lands (bays, wetlands, etc) encroached upon by private property. Rolling easements are now being employed in South Carolina and have been either been piloted or proposed in several other states. A rolling easement is an easement that allows the public ownership and/or access to tidelands and the wet beach to "roll" landward as sea level rises. Rolling easements do not prevent property owners from use of their property until that use eliminates tidelands and public access as sea level rises and the beach erodes. Property owners will view the easement as costing nothing unless they foresee sea level rise. Rolling easements are believed to be more constitutional than setbacks and has been advocated by the leading expert on sea level rise policy, James G. Titus, who writes:

Figure 18.1 The role of adaptation in reducing climate change damages

Adaptation will reduce the negative impacts of climate change (and increase the positive impacts), but there will almost always be residual damage, often very large. The gross benefit of adaptation is the damage avoided. The net benefit of adaptation is the damage avoided, less the cost of adaptation.

The residual cost of climate damage plus the cost of adaptation is the cost of climate change, after adaptation.



For the sake of simplicity, the relationships between rising temperatures and the different costs of climate change/adaptation are shown as linear. In reality, Part II and Chapter 13 demonstrated that the costs of climate change are likely to accelerate with increasing temperature, while the net benefit of adaptation is likely to fall relative to the cost of climate change.

"[Rolling easements] do not require particular lines to be drawn on a map and their impact on current property values would generally be less than one percent. Governments could afford to compensate riparian owners, but even a failure to compensate them would impose only a minor burden. Developers who deny that the sea will rise would view the policy as costing them nothing. Unlike setbacks, rolling easements allow landowners to decide how best to use their property between now and whenever the land finally erodes. Nevertheless, enforcement may be politically difficult. A combination of density restrictions, setbacks and rolling easements would probably be more successful than relying on any single option."

Table 5.2 Best Practices for Long-Term Retreat in Response to Sea Level Rise

State Program	Legislative Action	Comments
South Carolina Coastal Commission implemented rolling easements as part of an amendment to the Beachfront Management Act in the wake of Lucas vs. the South Carolina Coastal Council	Beachfront Management Act in 1990 SECTION 48-39-250 of the Act	Some property owners have challenged laws against seawalls and bulkheads, where erosion has been significant and prohibited immediately some uses of their property. South Carolina Coastal Council officials made small concessions which demonstrate the difficulty implementing rolling easements. http://www.scstatehouse.net/code/t48c039.htm and http://coastalmanagement.noaa.gov/initiatives /shoreline_ppr_easements.html
North Carolina Erosion-Setback Requirements		Tiered setback approach: Small structures (under five units and less than 5,000 square feet) must be set back thirty times the average annual erosion rate if rate is at least 2 ft/year, otherwise 60 feet. Structures over 5,000 square feet must be set back sixty times the average annual erosion rate. http://dcm2.enr.state.nc.us/Hazards/erosion.htm
Maui County Planning Commission: Erosion-based Setbacks		New development or rebuilding after coastal hazard to be set back fifty times the annual erosion rate plus 20 feet http://geopubs.wr.usgs.gov/open-file/of01-308/ http://www.soest.hawaii.edu/seagrant/bmpm/objectives_and_recom_6.html
Massachusetts Acquisition Planning	Community Preservation Act	Coastal Hazards Commission Recommendations: Community Preservation Act's Coalition should educate communities about their ability under the act to acquire storm prone property. Dept. of Fish & Game and the Dept. of Conservation and Recreation should acquire storm prone properties http://www.mass.gov/czm//chc/recommendations /recommendations.htm

NJDEP should update regulations to account for short term storm intensification and sea level rise:

The current regulatory framework in New Jersey affecting coastal and riparian lands, wetlands and floodplains, including areas affected by CAFRA and the Flood Hazard Control Act, for instance, should be updated to accommodate statewide climate change estimates. Regulations affecting coastal zones and wetlands, including but not limited to Erosion Hazard Areas and the Wetlands Buffer rule, must be updated to accommodate NJDEP short-term projections of sea level rise. Stormwater Management rules and the FHCA should be updated to accommodate increased stormwater flow from increased storm intensity. NJDEP must calculate these estimates based on current science, which will change periodically. These estimates should provide a moderate, rather than minimum level of protection in case sea level rises higher and occurs more rapidly than these average predictions.

Action Step 3: Encourage municipal adaptation planning through a pilot "Dry Cities" program sponsored jointly by NJDEP and NJOSG.

Table 5.3 Models for "Dry Cities" Program

State	Program	Links
Massachusetts	Storm-Resilient Communities Program: Proposed in Coastal Hazard Commission Recommendations	Effort to get municipalities to do better hazard mitigation planning. http://www.mass.gov/czm//chc/recommendations/recommendations.htm
The Netherlands	The Netherlands is pursuing a "room for rivers" program, which attempts to mitigate flood vulnerability given increasing rainfall through several measures. First, research suggests a variety of ways that the Netherlands main rivers can be adapted to allow for higher rates or volume of water discharge without expanding the river's borders. Some of these methods involve re-positioning of flood defenses in the river bank while other methods involve actually lowering the river bed and thus lowering flood heights.	A report on flood defense for rivers in the Netherlands: http://www.cws.net.cn/cwsnet/meeting-fanghong/v10104.pdf Cooperative program on water and climate change: http://www.waterandclimate.org/news/index.html
The United Kingdom	The UK's Department of Environment, Food and Rural Affairs is looking to convert certain floodplains that are not heavily developed (i.e. agriculture and underutilized uses) to areas that would absorb even more water than normally in the event of a flood. This approach could be used to mitigate flooding along some of NJ's rivers and would require, as recommended, strategic land conservation for flood defense purposes.	Department of Environment, Food and Rural Affairs program based on providing more space for water: http://www.defra.gov.uk/corporate/consult/waterspace/index.htm

"Dry Cities" should also help to protect New Jersey's Water Supply against Sea Level Rise:

Using sea level rise projection map data, map all municipal wells at risk for salt intrusion under two different scenarios: 1) vulnerability to universally adopted sea level rise and stormwater flow change estimates; 2) vulnerability to sea level rise and stormwater flow change under an accelerated sea level rise scenario. The second scenario should ensure that NJ's water supply is protected and can provide the increasing population of New Jersey needed water levels even if sea level rise, droughts and high flood levels are able to reduce the water supply either together or each separately to a level that would only occur with expected probability of 1 in 3,000[1]. Both scenarios will require implementation plans for increased storage capacity to accommodate heavier rainfall in wetter months to adapt to possible droughts in drier months.

Table 5.4 Using Transfer-of-Development Rights (TDRs)

TDR Programs	Websites
What is a TDR and how do they work?	http://www.nj.gov/dca/osg/resources/tdr/index.shtml, http://www.state.nj.us/agriculture/sadc/tdrbank.htm http://www.hawaiiislandplan.com/_library/documents/islandwide/planning-informational/transferable%20development%20rights%20overview.pdf
Highlands	http://www.highlands.state.nj.us/njhighlands/master/releases/tdr_background_and_program_development.pdf
Pinelands	http://www.state.nj.us/pinelands/infor/broch/density.html
NJ Littoral Society	https://littoralsociety.org/userfiles/doccenter/TDRfactsheet.pdf

Action Step 4: Preserve land strategically to protect natural resources from the impacts of climate change.

The trust method is particularly useful because it dedicates land for future preservation but does not limit the use of that land today, but acquisition can also be employed via the New Jersey Environmental Infrastructure Trust. NJDEP will have to provide data for land trust organizations and

[1] One of the standards of level of protection against flooding used in the Netherlands.

municipalities. This strategy will require heavy conservation efforts in current floodplain areas and along current wetlands. The third strategy will require the aggressive planning of greenways though much of New Jersey to be conserved to help protect species which may become endangered as a result of global warming. These greenways and newly preserved areas should be available for public use where possible and not overly intrusive into habitats. NJDEP should work with New York and Pennsylvania on cross-state greenways where sensible.

In collaborating with land conservation groups, consider enhancing the NJDEP website as a portal for land conservation efforts in the state. One example of such a portal is below:

http://www.nercrd.psu.edu/Toolbox/MA%20web%20pages/MAlandLINKS.cfm

For an example of active land conservation organizations in New Jersey with links to others, see: http://conservationresourcesinc.org/index.htm

Action Step 5: Enhance preparedness for more frequent and intense storms through improved emergency management plans and a clear chain of command.

Table 5.5 Model for Emergency Preparedness from Massachusetts

USA: MA Massachusettes Coastal Hazards Commission Office of Coastal Zone Management	Risk and Vulnerability Assessment Map (RVAM): To be conducted by each coastal community to help with emergency response planning. RVAM should show infrastructure, facilities, evacuation routes and other socioeconomic vulnerabilities to coastal hazards. Should include local zoning, property lines and values. http://www.mass.gov/czm//chc/recommendations/recommendations.htm	Recommended by Coastal Hazards Commission Aug. 2006	Recognized that municipalities need a standardized GIS methodology or database for them to create a RVAM for their coastal community. Most municipalities lack the expertise to develop this without technical help. Report recommends partnering with the US Geological Survey and others to map future vulnerability to erosion, storm flooding and inundation.

Action Step 6: Partner with the insurance industry to develop a climate change risk management strategy.

Although insurers may have an understanding of climate change, most have not yet incorporated the risk of climate change into their business models. If insurers are sending out inappropriate signals to the market—say, signaling that the risk of a storm is much lower than it actually is—then residents of coastal areas may be less inclined to adopt adaptation measures. A partnership would allow NJDEP to work with individual insurers so that they reassess the risk of insuring property that could be affected by climate-change induced storms of greater magnitude than previously seen. A partnership would also allow NJDEP, New Jersey Department of Banking and Insurance (NJDOBI) and the insurers to brainstorm ways in which insurers can provide premium deductions for preventative mitigation.

Table 5.6 Examples of Climate Change Risk Management Programs for Insurers

Country/Entity	Program
USA, FEMA	Community Rating System, where communities can earn points toward flood insurance premium discounts http://www.fema.gov/business/nfip/crs.shtm
UK, Association of British Insurers (ABI)	ABI website: http://www.abi.org.uk/Display/default.asp?Menu_ID=1090&Menu_All=1,1088,1090&Child_ID=553 Flood-resistant guidelines for post-storm reconstruction of properties: http://www.abi.org.uk/Display/File/Child/553/Flood_Resilient_Homes.pdf Risk-management for government: http://www.abi.org.uk/Display/File/Child/553/makingspaceforwater.pdf
USA, Massachusetts	Massachusetts has an Insurers Insolvency Fund, which covers claims up to $300K when insurers become insolvent. Coastal Hazards Commission recommended that the Massachusetts Division of Insurance should: 1. Explain insurance policy facts and benefits to homeowners 2. Explore the feasibility of working with insurance companies to encourage homeowners to make storm resistant retrofits 3. Increase the Insurers Insolvency Fund's maximum coverage http://www.mass.gov/czm//chc/recommendations/recommendations.htm

Appendix 6: Awareness

Goal 6: Increase public support for climate change mitigation and coastal adaptation policies by raising awareness.

Action Step 1: Create a state-wide public awareness campaign on climate change and steps residents can take to mitigate it.

Table 6.1 Resources to Increase Public Support for Policies that Mitigate Climate Change and Protect the Coasts by Raising Awareness

Organizaiton/ Location	Description	Website
London, UK	Organizations like the London Climate Change Agency have made climate change an integral part of daily life for Londoners, city planning and policy efforts. In 2000 climate change was not on the policy agenda for the city. However, efforts by the current Mayor Ken Livingstone and Allan Jones (CEO, London Climate Change Agency) has made protecting the environment a central part of the administration.	London Mayor's Website on Environment: http://www.london.gov.uk/london-life/environ:ment/index.jsp London Climate Change Agency:http://www.lcca.co.uk
Fight Global Warming	Fight Global Warming is a public awareness campaign by the non-profit, Environmental Defense and the Ad Council and funded by the Robertson Foundation. The campaign includes a dynamic website where the general public can learn more about climate change, calculate their personal contribution to global warming and learn more about what they can do to slow global warming. The campaign also includes TV ads and literature.	http://www.fightglobalwarming.com/
Flex Your Power	Flex Your Power is California's statewide energy efficiency marketing and outreach campaign. Initiated in 2001, Flex Your Power is a partnership of California's utilities, residents, businesses, institutions, government agencies and non-profit organizations working to save energy. The campaign includes retail promotions, a comprehensive website, an electronic newsletter, educational materials and advertising. Flex Your Power has received national and international recognition, including an ENERGY STAR Award for excellence.	http://www.fypower.org
Flex Your Power Briefing Room	The Briefing Room provides easy access to California energy efficiency outreach materials, press & media resources and campaign information for our partners, affiliates, media, journalists and stakeholders.	http://www.fypower.org/briefing_room/
Flex Your Power – Energy Conservation and Efficiency Campaign 2001- 2002 - Final Report	An in-depth look at what led California to start this campaign as a response to their energy crisis and the steps needed to implement it and make it successful.	http://www.fypower.org/pdf/FYP_Report.pdf
Flex Your Power Program Implementation Plan	Program Implementation Plan for "Flex Your Power", including the total budget ($30,000,000), program description and descriptions of programs.	http://www.fypower.org/pdf/EP_PIP_Narrative.2.17.04.pdf
Flex Your Power – Operating Budget	Detailed budget of the various components and operations of the budget for 2005-2005. The website development cost $132,246.	http://www.fypower.org/xls/EP_PIP_Budget_102204.xls
UK Climate Change Communication Initiative	This is a UK based non-profit organization dedicated to raising awareness about climate change among the general British public and encourage action. The organization is led by the UK Department of Environment, Food and Rural Affairs (DEFRA), in partnership with the UK Energy Saving Trust, the UK Carbon Trust, the UK Department of Trade and Industry, the UK Environment Agency, the UK Climate Impacts Programme and the UK Department of Transport.	http://www.climatechallenge.gov.uk/index.html

On the Brink	Founded in 2002, On the Brink is dedicated to creating innovative film, television and new media programming that informs the public about critical threats to our environment posed by ongoing human activities—while also motivating viewers to become actively engaged in the efforts to solve these problems.	http://www.onthebrink.org/
Build it Green	Build It Green is a professional non-profit membership organization whose mission is to promote healthy, energy and resource-efficient buildings in California. Supported by a solid foundation of outreach and education, Build It Green connects consumers and building professionals with the tools and technical expertise they need to build quality green buildings.	http://www.builditgreen.org/
The Energy Coalition	The Energy Coalition is a California based non-profit started in 1981 that helps city government, businesses, students and residents to practice smart energy management for a healthy energy future. It is funded from the public goods fund collected from ratepayers statewide.	http://www.energycoalition.org/
Washington State Department of Ecology	Calling this initiative, "Plain Talk", the office has a policy since 2003 which requires all Employees to write documents the intended audience can understand. The WA Department of Ecology has an excellent website with updated and appropriate information for the general public and businesses that need information about the environment, regulations and public forums.	http://www.ecy.wa.gov/ecyhome.html
Geraldine R. Dodge Foundation	The mission of the Geraldine R. Dodge Foundation is to support and encourage those educational, cultural, social and environmental values that contribute to making society more humane and the world more livable.	http://www.grdodge.org/
RideWise	RideWise, (the traffic and transportation division of the Somerset County Business Partnership), works to reduce traffic, improve mobility and make commuting easier by providing free services to help individuals carpool, use mass transit, bike and walk. Their services are free and available to anyone who commutes to a worksite in Somerset County, or any employer in Somerset County.	http://www.ridewise.org/
The Essex County Environmental Commission	The Essex County Environmental Commission is dedicated to creating awareness, understanding and appreciation of the environment and its relationship to Essex County residents. Their mission is to be an exemplary environmental education source that assists county residents in learning how to live and interact harmoniously with each other and the natural world. The commission serves as a bridge for the diverse population that lives and works in Essex County, providing information to grassroots community groups and other stakeholders to engage them in the environmental decision-making process and help work towards environmental justice throughout the county.	http://www.essex-countynj.org/index.php?section=dept/p/env/ecm
NJ Future	New Jersey Future was founded to achieve smart growth statewide: growth that protects New Jersey's open lands and natural resources, strengthens our communities, makes it easier to get around and increases our housing choices. New Jersey Future fulfills this mission through original research, policy analysis, public education and advocacy.	http://www.njfuture.org
Minnesota SEEK - Sharing Environmental Education Knowledge	SEEK is a comprehensive online clearinghouse for energy efficiency information. Includes access to GreenPrint, the state's energy efficiency action plan, as well as to articles, lesson plans, job postings and a directory of all online resources.	http://www.seek.state.mn.us/index.cfm
California Education and the Environment Initiative (EEI)	EEI groundbreaking legislation that mandates creation of a unified, statewide K-12 energy efficiency strategy. Overseen by the Environmental Protection Agency and the California Integrated Waste Management Board, EEI requires that the state develop education principles and concepts for the environment and align these principles to the state's academic content standards. In addition, the legislation requires that California develop a model EEI curriculum for K-12 schools and incorporate the environmental principles into criteria for textbook adoption for history/social science, English/language arts and mathematics. EEI is implemented by an Education Partnership that includes representatives from four state agencies and nongovernmental organizations.	http://www.calepa.ca.gov/Education/EEI
Wisconsin Environment Education Board (WEEB)	Created by state legislation in 1990, WEEB is a 17 member Board with members from the state's major universities, state senators and representatives, Secretary of the Department of Natural Resources, the Superintendent of Public Instruction and representatives from the following sectors: Agriculture, Business and Industry, Conservation and Environmental Organizations, Energy Industry, Environmental Educators, Faculty of public and private institutions of higher education, forestry, labor, as well as nature centers, museums and zoos. WEEB identifies needs and establishes priorities for environmental education, makes grants for environmental education and seeks private funds in support of the grants program.	http://www.uwsp.edu/cnr/weeb/index.htm

Action Step 2: Advocate for the continuation and expansion of environmental education in New Jersey's public schools.

Curriculum changes should be proposed to the New Jersey High School Redesign Steering Committee. Their website can be found at http://www.njhighschoolsummit.org/. The Steering Committee is co-chaired by Governor Corzine, Prudential Financial Chairman and CEO Arthur F. Ryan and Montclair State University President Susan A. Cole.

Action Step 3: Promote energy efficiency practices, products and services.

Table 6.2 Best Practices for Public Education Campaigns

Program Name and Location	Description	Website
"Fight Global Warming" United Kingdom's Environmental Defense Agency	This campaign (a partnership between Environmental Defense and the Ad Council) allows visitors to calculate their emissions and provides information on what people can do to reduce their energy use (See Table 6.1 for more information).	http://www.fightglobalwarming.com
"Flex Your Power"California Efficiency Partnership	This campaign from California has an interactive and user-friendly website with information about energy savings, including locations of stores that sell energy-efficient products, rebates and incentives targeted towards residents, commercial businesses, industries, institutions and agriculture (See Table 6.1 for more information).	http://www.fypower.org
"The Climate Change Communication Initiative"United Kingdom	This initiative (a partnership among several government agencies in the UK) provides information about climate change and offers steps to save energy in a manner that is interactive and user-friendly. The website also provides short videos, animation features for children, radio broadcasts clips for download and general information (See Table 6.1 for more information).	http://www.climatechallenge.gov.uk/

Maximize funding by leveraging out-of-state resources. There are a number of different funding sources for state efforts to build awareness around climate change and other environmental issues. NJDEP could also apply to these funding sources to help non-profit organizations in their own awareness projects as well as provide them with information on funding sources. The list below is a sample of some major grants and is by no means exhaustive.

Table 6.3 Examples of Funding Resources for a Climate Change Awareness Program

Name of Funding Opportunity	Website	Description
EPA Environmental Education Grants	http://www.epa.gov/enviroed/index.html	Major source of education funding for both state and local school districts and nonprofits to build capacity to provide environmental education. Grants from EPA Headquarters range from $70,000 to $90,000. NJDEP received this grant in 1997 to revamp New Jersey science curriculum.
Environmental Media Fund	http://www.environmentalmediafund.org/Home.aspx	Provides funding and support for media projects, including television, video and print campaigns to increase awareness of environmental issues.
EE Link	http://eelink.net/grants-eespecificresources.html	Directory of environmental education and awareness funding on the North American Association of Environmental Education website
NOAA Environmental Literacy Grants Program	http://eelink.net/grants-eespecificresources.html	Large Grants (between $200,000 and $750,000) to promote the expansion of Earth Sciences instruction in K-12 education, as well as grants to support agencies and organizations to develop outreach and awareness campaigns on Earth Sciences.
NSF Instructional Materials Development Program	http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5468	Funding to create the development of instructional frameworks for science learning, the development of instructional materials for students and the creation of tools for assessing student science learning.
NSF Complete List of Funding for Environmental Research and Education	http://www.nsf.gov/geo/ere/ereweb/fundlisting.cfm?09560946044806144F1D4B14474914	Comprehensive list of funding opportunities.