

**Meeting New Jersey's 2020 Greenhouse Gas Limit:
New Jersey's Global Warming Response Act
Recommendations Report**

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New Jersey Department of Environmental Protection

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Executive Summary

There is broad scientific consensus that human-caused greenhouse gas (GHG) emissions are impacting the earth's climate, and that increasing atmospheric GHG concentrations will result in very significant adverse global, regional, and local environmental impacts.¹ The Northeastern United States is particularly vulnerable to the impacts of climate change, with potentially devastating ecological, economic and public health impacts to New Jersey.² Not only does climate change threaten New Jersey's shoreline and ecology, but the socioeconomic impacts of climate change stand to be profound and costly.

Recognizing this immediate need, New Jersey enacted the Global Warming Response Act (GWRA) (P.L. 2007, c.112) on July 6, 2007. The GWRA calls for a reduction in GHG emissions to 1990 levels by 2020, approximately a 20 percent reduction below estimated 2020 business-as-usual emissions, followed by a further reduction of emissions to 80 percent below 2006 levels by 2050. As required under the Act, this report specifically provides the Governor, Treasurer and the State Legislature with recommendations for achieving the 2020 statewide GHG limit. The report also recognizes the contributions that a set of other public policies, not developed primarily to address climate change, will have on reducing statewide GHG emissions. A draft of this report was issued for stakeholder comment in December 2008. All of the climate-specific recommendations and related actions in this final report take into consideration the numerous comments received by the State during its stakeholder period. As demonstrated throughout the report, meeting the State's ambitious GHG limits will require not only long-term measures, but also immediate actions that will both stabilize GHG emissions in the short-term and create a foundation for the carbon-neutral future required to meet the 2050 limit. Attaining the State's 2050 limit (approximately 26 MMT CO₂eq) will also provide ancillary benefits of transforming the New Jersey economy to one that drives creation of "green" jobs by making clean energy and technologies a cornerstone of the State's economy.

As highlighted by the scope and nature of the recommendations and related actions included in this report, global climate change affects all aspects of our lives, and the scope of measures needed to meet New Jersey's GHG limits is extensive. Therefore, this report includes an array of recommendations and related actions, including legislative, regulatory and market-based measures, which provide a balance that will allow New Jersey to meet its statewide GHG limits without unduly burdening any one particular sector or industry. This report provides a comprehensive technical and financial framework for decision making on a range of specific actions that can be taken to reduce GHG emissions in New Jersey.

New Jersey Statewide Greenhouse Gas Inventory

Released on October 31, 2008, the State's first GHG inventory and forecasts³ presents a preliminary assessment of New Jersey's statewide anthropogenic GHG emissions (including CO₂, methane (CH₄), nitrous oxide (N₂O), and certain halogenated gases) and sinks (carbon

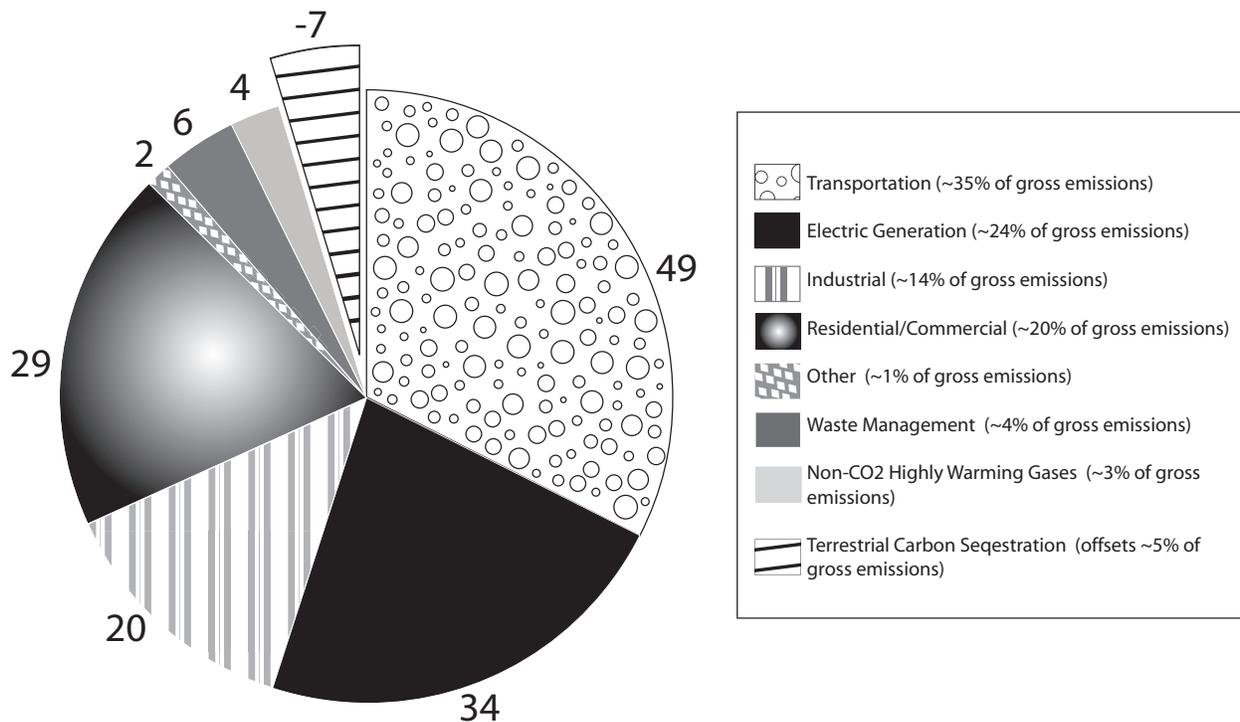
¹Intergovernmental Panel on Climate Change, *Climate Change 2007: Synthesis Report, Summary for Policymakers*, Fourth Assessment Report, November 2007.

²Frumhoff, P.C., J.J. McCarthy, J.M. Melillo, S.C. Moser, and D.J. Wuebbles. 2007. *Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions*. Synthesis report of the Northeast Climate Impacts Assessment (NECIA). Cambridge, MA: Union of Concerned Scientists (UCS).

³"New Jersey Greenhouse Gas Inventory and Reference Case Projections 1990-2020", November, 2008. This document is posted on the State's Global Warming Web page at <http://www.nj.gov/globalwarming/>.

storage). As shown by Figure ES 1, the inventory is broken out into eight sectors, each contributing to New Jersey's overall GHG emissions profile.

Figure ES 1: GHG Emissions by Sector; New Jersey, 2004 Millions of Metric Tons CO₂eq (Source: New Jersey GHG Inventory and Reference Case Projections 1990-2020 November 2008)



New Jersey statewide GHG emissions in 1990 were approximately 123 million metric tons (MMT) of CO₂ equivalent per year. By 2004⁴, those emissions had risen 11 percent to approximately 137 MMT. Under a business-as-usual scenario, emissions are projected to increase 25 percent over 1990 levels to approximately 154 MMT per year by 2020.

Ensuring Attainment of the Statewide 2020 Greenhouse Gas Limit

Three core measures form the backbone of New Jersey's plan to meet its statewide 2020 GHG limit. The core measures implement the:

- New Jersey Energy Master Plan (EMP);
- New Jersey Low Emission Vehicle (LEV) program; and,
- Regional Greenhouse Gas Initiative (RGGI) program.

The core measures are targeted at reducing GHG emissions from the two largest contributors to New Jersey GHG emissions – transportation and energy – and they lay the groundwork for all future actions in these areas.

⁴The State has completed GHG inventory estimates for 2005, 2006 and 2007. Data show that differences from the 2004 to 2007 totals are minor; the sectoral proportions are similar.

Energy Master Plan. After an intensive public participation process, the New Jersey Board of Public Utilities (NJBPU) released the State's EMP⁵ on October 22, 2008. The EMP provides the State with a road map for reaching a responsible energy future with adequate, reliable energy and heating supplies that are both environmentally responsible and competitively priced. The EMP establishes the following five goals:

- Maximize energy conservation and energy efficiency to achieve reductions in statewide energy consumption of at least 20 percent by 2020;
- Reduce peak electricity demand for electricity by 5,700 MW by 2020;
- Strive to exceed the current renewable portfolio standard of 22.5 percent by 2020, and meet 30 percent of the State's electricity needs from renewable sources by 2020;
- Develop a 21st century energy infrastructure that supports the goals and action items of the Energy Master Plan, ensures reliability of the system, and makes available additional tools to consumers to manage their energy consumption; and,
- Invest in innovative clean energy technologies and businesses to stimulate the industry's growth in New Jersey.

Low Emission Vehicle Program: On November 28, 2005, New Jersey adopted a Low Emission Vehicle (LEV) program modeled after California's LEV Program.⁶ The program contains three components: vehicle emission standards, fleet-wide emission requirements and a Zero Emission Vehicle (ZEV) sales requirement. New Jersey's adoption of its LEV program ensures that vehicles designed to incrementally produce fewer and fewer GHG emissions over time will be available for purchase in New Jersey.

On September 28, 2009, the U.S. Environmental Protection Agency and the U.S. Department of Transportation jointly proposed federal motor vehicle GHG emission standards and related fuel economy standards for model years 2012 through 2016.⁷ Once adopted, this federal motor vehicle control program could impact the GHG emission reductions projected for the New Jersey LEV program.

Regional Greenhouse Gas Initiative: New Jersey is one of ten states participating in the Regional Greenhouse Gas Initiative (RGGI), a ten-state mandatory CO₂ cap-and-trade program to reduce CO₂ emissions from the electric power sector. The RGGI program caps regional power plant CO₂ emissions from 2009 through 2014 and then reduces those emissions 10 percent by 2018. RGGI's phased approach means that reductions in the CO₂ cap will initially be modest, providing predictable market signals and regulatory certainty. Electricity generators will be able to plan for and invest in lower-carbon alternatives and avoid dramatic electricity price impacts.

Under the RGGI program, regulated power plants must hold an emission permit, or allowance, for every ton of CO₂ they emit. Allowances are sold quarterly at auction; states will use the proceeds of allowance auctions to support low-carbon-intensity solutions, including energy efficiency and clean renewable energy, such as solar and wind power.

According to an analysis conducted by the New Jersey Department of Environmental Protection (NJDEP) (included as Appendix 1 of this report) the three core measures, if fully successful and

⁵The Energy Master Plan can be downloaded from <http://www.nj.gov/emp>

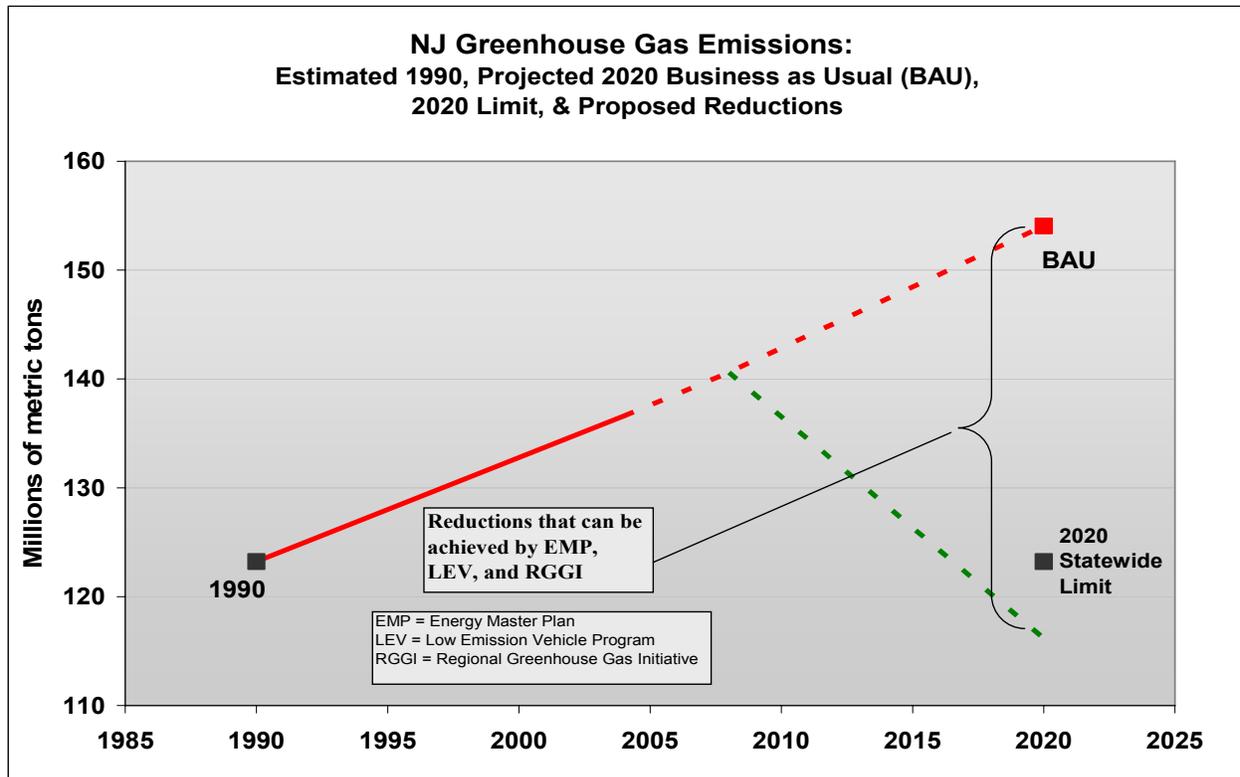
⁶38 N.J.R. 497(b), (January 17, 2006).

⁷74 Fed. Reg. 49454, September 28, 2009.

fully implemented on schedule, would result in a reduction of approximately 38 MMT CO₂eq below the estimated business-as-usual emission level of 154 MMT CO₂eq, or 116 MMT CO₂eq, by 2020. This would allow the State to meet its statewide 2020 limit of 123 MMT CO₂eq.

Figure ES 2 shows the impact of failing to implement these core recommendations, instead allowing for a business-as-usual scenario for the State. Economic impact analyses conducted by the Rutgers University Center for Energy, Economic and Environmental Policy (CEEPP), found that the implementation of the EMP (including RGGI) would have a negligible impact on the State’s economy and that the implementation of the LEV program would add minimally to that impact (see Chapter 2 and Appendix 2 for further information).

Figure ES 2: NJ Greenhouse Gas Emissions⁸



All emission and reduction quantities are estimates. The actual statewide emissions up to and including 2004 are unlikely to be more than 5 percent higher or lower than these estimates. The projections to 2020, and the proposed reductions, are considerably less certain. Reductions attributable to RGGI are difficult to quantify at a statewide level because the RGGI limits are regional. For purposes of the 2020 estimates that reflect the various reductions, the emissions from New Jersey facilities covered by RGGI are considered to be equal to New Jersey's estimated share of the total RGGI limit. All numbers are subject to revision by the NJDEP as better information becomes available.

Actions Now for Future Impact

While meeting the State’s 2020 GHG limit is an essential first step for New Jersey, implementing additional measures in the near-term will ensure that the State stays on track to meet its 2050 limit. In addition to the three core recommendations, this report identifies a set of

⁸Based on data in “New Jersey Greenhouse Gas Inventory and Reference Case Projections 1990-2020”, November, 2008. This document is posted on the State’s Global Warming Web page at <http://www.nj.gov/globalwarming/>.

22 supporting recommendations (see Table ES-1) to ensure attainment of the 2020 statewide limit. Additionally, this report acknowledges the GHG emission reductions anticipated as a result of several other significant statewide public policies.

Successful implementation of these recommendations will require the participation, collaboration and cooperation of a broad spectrum of State agencies, businesses, organizations, public officials, and New Jersey citizens. Therefore, outreach and education will be a crucial component of the State’s efforts, as discussed in greater detail in Chapter 5 of this report.

Table ES 1: 2020 Climate-Specific Supporting Recommendations

Electric Generation
Recommendation #1: Establish standards for fossil fuel EGUs
Industrial
Recommendation #2: Implement requirements for non-EGU industrial sources
Residential/Commercial
Recommendation #3: Develop and facilitate the use of State Green Building Guidelines for all New Residential and Commercial Buildings
Recommendation #4: Develop and facilitate State Green Building Remodeling, Operations and Maintenance Programs for all Existing Residential and Commercial Buildings
Waste Management
Recommendation #5: Provide incentives to reduce the carbon footprint of public water supply and wastewater treatment facilities
Recommendation #6: Implement initiatives designed to support the creation of electricity or heat from waste sources
Non-CO₂ Highly Warming Gases
Recommendation #7: Monitor the development of other states’ actions to reduce non-CO ₂ highly warming gases and consider if they are appropriate to be implemented in New Jersey
Recommendation #8: Broaden scope of building codes to address high Global Warming Potential (GWP) gases
Recommendation #9: Add high GWP gas requirements for HVAC contractors
Recommendation #10: Institute a Leak Detection and Repair program for high-GWP gases from commercial and industrial refrigeration equipment
Recommendation #11: Reduce HFC emissions from the do-it-yourself servicing of motor vehicle air conditioning systems
Terrestrial Sequestration
Recommendation #12: Require State-funded projects to comply with the no net loss goal of forested area and tree replacement provisions of the “No Net Loss Act”
Recommendation #13: Establish legislation, develop policies (e.g. financing via Garden State Preservation Trust (GSPT)) or implement through existing programs (e.g., re-adoption of the stormwater rules) on-site tree preservation percentage requirements for new development consistent with tree canopy target recommendations of American Forests (formerly the American Forest Association)
Recommendation #14: Develop Agricultural Best Management Practices to address energy efficiency, renewable energy and the release of GHGs in agricultural operations and structures
Transportation and Land Use
Recommendation #15: Determine needs for implementing infrastructure alternatives to conventional motor vehicle fuels (i.e., gasoline and diesel) in New Jersey
Recommendation #16: Implement transportation-related initiatives and demonstration projects
Recommendation #17: Develop and implement a LCFS through a multi-state effort
Recommendation #18: Establish a carbon footprint standard for transportation projects
Recommendation #19: Employ efforts for effectively implementing the State Development and Redevelopment Plan (SDRP)

Recommendation #20: The NJDOT and the NJDEP will work cooperatively with all three Metropolitan Organizations (MPOs) to ensure that they incorporate growth management and GHG reduction goals into their plans and programs
Recommendation #21: The State will work in partnership with local and regional entities to conduct an infrastructure capacity assessment of the 113 municipalities that will benefit from the ARC ⁹ tunnel as well as the municipalities that are served by, and feed, the Port Authority Transit Corporation (PATCO) rail and bus lines, and whose residents commute to Atlantic City, Camden and Philadelphia
Recommendation #22: Explore fuel-efficient vehicle incentive programs

The State engaged the Center for Climate Strategies (CCS) and Rutgers University Center for Energy, Economic & Environmental Policy (CEEPP) to assess the GHG emissions reduction potential and economic impacts of the supporting recommendations and related actions discussed in this report. These analyses focused on a subset of the supporting recommendations and related actions that were sufficiently well-developed to be quantifiable.

With respect to emission reduction potential, the supporting recommendations and related actions quantified as part of these analyses would result in an estimated 26 MMTCO₂eq of reductions beyond the 38 MMTCO₂eq of GHG emission reductions expected for 2020 from implementation of the three core measures, resulting in a total of 64 MMTCO₂eq of GHG emission reductions in 2020. The largest additional GHG emissions reduction potential lies in the transportation sector, followed by the waste management and building sectors. With the amount of reduction needed by 2020 defined as the difference between the Business-as-Usual projection of 154 MMTCO₂eq for 2020 and the 2020 limit of 123 MMTCO₂eq, or 31 MMTCO₂eq, these analyses show that the supporting recommendations and related actions provide an important start towards achievement of the 2050 limit.

With respect to economic impacts, the core and supporting recommendations and related actions taken as a whole are projected to result in a slight gain in total employment and slight decreases in personal income and Gross State Product (GSP) in 2020. The decreases in personal income and GSP result from the fact that the analysis assumes higher prices for zero-emission and low-emission vehicles and energy efficient homes; those assumptions are projected to lead to lower new vehicle registrations and residential building permits and consequently lower retail sales. It should be noted that these results do not reflect environmental co-benefits such as preservation of natural capital or reduction of SO₂ and NO_x costs.

For several reasons, the projections used in these economic analyses are probably on the conservative side. First, the costs of the measures analyzed tend to be incurred as up-front investments, while the resulting benefits accrue over a period of years. For example, planting trees to sequester carbon or putting infrastructure in place to reduce VMT are actions that have high initial costs, but will incrementally reduce the impacts of GHG emissions, preventing even more expense in the future. Therefore, delays that would increase impacts to forests such as forest loss or damage or property loss from flooding result in even greater costs to respond to these losses in the future. Second, since the analysis uses a 2020 time horizon, benefits occurring in later years are not counted. Third, while costs can usually be estimated in monetary terms, some benefits such as quality of life and species preservation are difficult or impossible to

⁹ARC stands for “Access to the Region’s Core”, a transit project designed to increase the capacity of the rail system under the Hudson River, which connects New York and New Jersey.

quantify and hence cannot be included in an analysis of this type, including some environmental benefits.

To reach the 2020 GHG limit, the State will need to undertake a suite of policy measures, some of which are more cost-effective than others. The State is pursuing what are expected to be the most cost-effective measures first, namely the three core recommendations. The macroeconomic impacts of the core measures are negligible. The supporting recommendations and related actions are somewhat more expensive; but even with these more expensive measures, the overall net economic impact of the full suite of policy measures would still be negligible. Considering the major stakes New Jersey has in mitigation of climate change, the projected economic effects can be seen as a cost-effective insurance policy and as an investment in maintaining New Jersey's economic vitality and quality of life.

Adaptation

Despite our best efforts to mitigate climate change in New Jersey, we must recognize that emission reductions alone are not a sufficient policy response to climate change. Once emitted, CO₂ and other GHGs reside in the atmosphere for decades or centuries.¹⁰ Even if all GHG emissions were stopped immediately, there would still be a time lag between mitigation of emissions and cessation of warming. Because of New Jersey's uniquely diverse terrain, nearly all the impacts of climate change, from rising temperatures in our urban areas to sea level rise jeopardizing our coastal ecosystems to threats to our unique agricultural industries, will be experienced throughout the State. Each of these impacts threatens the public health of New Jersey residents, as well as the ecology and economy of State.

This report recommends that the State develop adaptation strategies to minimize climate-related risks to public health, the environment and the economy. The report recommends that experts from academia, government, non-governmental organizations, and the business community develop policy recommendations on the most pressing adaptation policies New Jersey should adopt to significantly reduce the State's risks from climate change impacts. By bringing together various constituencies to develop a statewide climate change adaptation plan, New Jersey can be proactive in fostering adaptive capacity in the built and natural environment and public health infrastructure statewide to respond to climate change.

Beyond the 2020 Recommendations: Setting the Stage for 2050 and Implementation in the Coming Months

While achieving the 2020 statewide GHG limit requires a firm commitment across the public and private sectors, there is confidence and certainty that the means to do so are clear and achievable. The essential steps are prompt action and an on-going dedication to results. However, the 2020 limit is an interim milestone intended to stabilize emissions. The 2050 limit – to reduce emissions to a level 80 percent below 2006 emission levels represents the emission level scientists advise is needed to avoid the most catastrophic potential effects from climate change.¹¹

¹⁰IPCC.2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

¹¹It is understood that New Jersey's independent achievement of the 2050 limit will not preclude local climate change impacts; New Jersey recognizes its obligation to be part of the necessary global response if the most catastrophic impacts are to be avoided.

While this report provides a foundation for reaching the 2050 limit, additional public dialogue is needed to identify more specific actions to be implemented in the mid and long-term. This report discusses the four key policy areas that need to be considered in order to attain the 2050 GHG limit: 1) energy efficiency and conservation; 2) renewable electricity and fuels; 3) creation of natural CO₂ sinks; and 4) dramatically reduced reliance on cars. While taking aggressive action in these four key policy areas will provide the greatest GHG emission reductions over the long term, transformation in these areas will require not only bold and effective public policy, but also the creation of new technologies and markets that will drive a climate-friendly economy.

Within each of the four broad areas above, the State recommends an initial set of long-term indicators for tracking progress toward meeting the 2050 limit:

- The use of renewable energy sources in the State’s energy portfolio will continue to increase aggressively until the majority of sources of electricity generation in New Jersey come from carbon neutral sources.
- All new buildings constructed after 2030 will have a net zero energy consumption through a combination of energy efficiency requirements and renewable energy sources.
- The current level of terrestrial carbon sequestration will increase by 1.53 million metric tons (MMT) CO₂ annually by 2020 and by 3.14 MMTCO₂ per year by 2050. This will raise the sequestration capacity from 7 MMTCO₂ to at least 8.53 MMTCO₂ annually by 2020 and to at least 11.67 MMTCO₂ annually by 2050. This will result from both an (a) expansion of the green infrastructure¹² and the implementation of the other supplemental terrestrial carbon sequestration measures¹³ recommended in this report, and (b) investment¹⁴ on at least half of the approximately 700,000 acres of state lands that are being incorporated in the forest and tidal marsh stewardship and restoration program under the Global Warming Solutions Fund (GWSF) Act. Moreover, New Jersey will further increase its terrestrial sequestration in 2050 (by an additional 2.39 MMTCO₂ annually) through new natural sink enhancement measures on forest lands thereby raising the total target capacity to 14.07 MMTCO₂ annually.
- VMT growth between now and 2020 will be limited to a rate of no more than 1 percent per year, and will stabilize thereafter.
- All vehicular VMT in New Jersey will be “green” VMT within the next 15 years.¹⁵
- By 2050, ninety percent of development in New Jersey will occur in areas already served by public infrastructure, and 99 percent of that development will be in the form of redevelopment.
- By 2050, at least 90 percent of all buildings in New Jersey will be fully occupied.
- Transit ridership will double by 2050, and green commuting options will be expanded such that all New Jersey residents will be guaranteed alternative transportation options to get to work beyond single occupancy vehicles.

Given the scope of public policies that will be necessary to achieve the 2050 goal, this process can greatly benefit from specific expertise and informed judgment. Recognizing such, the GWRA recommends creation of an Independent Research Panel (IRP) to evaluate the climate-

¹²Increase in area of preserved forestlands, wetlands, and associated agricultural landscapes by at least 10,000 acres annually for 10 years through Garden State Preservation (GSPT) acquisitions. This projection assumes that there is no further re-authorization of the GSPT after the 10 -year period.

¹³Forest Stewardship, No Net Loss Reforestation, Forest Cover/Tree Canopy Requirement, and Sustainable Agriculture

¹⁴Applying proceeds from the RGGI auctions as directed by the Global Warming Solutions Fund law (N.J.S.A. 26:2C-50 et. seq.) in the first 5 years.

¹⁵The NJDEP defines a “green” vehicle as a car or light-duty truck with a California 2009 GHG score of 9 or greater (equivalent to 33 miles per gallon or greater).

specific recommendations and related actions set out in this report and provide an assessment of the ecological, economic and social impacts that may result from their implementation, as well as to recommend actions that will allow the State to meet the 2050 limit. It is essential that this panel, in addition to various stakeholders who will be central to the 2050 plan's achievement, have a meaningful voice in its creation and endorsement.

Conclusion

In conclusion, this report provides:

- A cautiously optimistic analysis that shows that New Jersey can meet its 2020 statewide GHG limit with the timely and fully successful implementation of the State EMP, the LEV program and RGGI;
- A support plan that would put the State on track to meet its 2050 statewide limit;
- An overview of the potential economic and environmental impacts that could be expected from implementation of the 2020 climate-specific supporting recommendations and related actions;
- A discussion of how to develop 2050 actions that focus on the four key policy areas necessary to ensure compliance with that limit – energy efficiency and conservation; renewable electricity and fuels; creation of natural CO₂ sinks; and dramatically reduced reliance on cars;
- An adaptation planning approach that draws on the creativity and expertise of a broad range of experts and stakeholders; and,
- An outreach and education approach that will be key to the successful communication and implementation of the overall plan.