The Fund for New Jersey

HAVING AN IMPACT ON CLIMATE CHANGE:
Policies to Spur Reductions of Greenhouse Gas Emissions[1]

Prepared for the Trustees of The Fund for New Jersey, June 2015

Climate Change Defined

Scientists worldwide overwhelmingly agree that climate warming trends over the last century are very likely due to human activity.[2] Certain atmospheric gases – carbon dioxide (CO_2), methane, nitrous oxide,[3] and chlorofluorocarbons (CFCs) – trap heat, contributing to a "greenhouse" effect in which the Earth's temperature increases. Human activity such as burning fossil fuels (coal, oil, natural gas) increases CO_2 and other greenhouse gas concentrations in the atmosphere, thereby "forcing" climate change.[4]

In 2013, the daily level of carbon dioxide measured in the atmosphere surpassed 400 parts per million (ppm) for the first time in human history.[5] In March 2015, for the first time since records began, atmospheric CO_2 measured more than 400 ppm globally for a month.[6] This is distressing because scientists have estimated the upper safety limit of carbon dioxide in the atmosphere to be 350 ppm, a level not observed since 1988. This warming has been happening since the Industrial revolution (in the interval humans have increased CO_2 concentration from 280 to 400 ppm), but scientists are alarmed at the rapid rate of growth.

The concomitant global temperature increase (approximately 0.85°C since 1880) puts us on a track toward catastrophic climate change (the tipping point is no more than 2°C and some scientists say 1°C). The consequences of global climate change are now evident around the world and have rapidly shifted from a problem threatening future generations to a crisis impacting the current one. The natural consequences of climate change include superstorms such as Hurricane Sandy, rising sea levels (estimated to be up to 18 inches by 2050 and 6.3 feet by 2100, not including storm surges[7]), and extreme fluctuations in heat and precipitation.

The human costs of these expected climate consequences will be severe in New Jersey. Although the problem is a global one and its causes transcend borders, the harms will happen

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[1] Questions should be directed to Kiki Jamieson, President: kjamieson@fundfornj.org or 609.356.0421.
[2] http://climate.nasa.gov/scientific-consensus/ 97% of actively publishing scientists agree.
[3] CO_2 is created through burning oil, natural gas, and coal; methane (CH_4) is emitted during the production of oil, natural gas, and coal as well as from livestock, composting, and decaying waste in landfills; and nitrous oxide (N_20)is emitted during the combustion of fossil fuels and solid waste and from agricultural and industrial practices.
[4] http://climate.nasa.gov/causes/
[5] http://climate.nasa.gov/solutions/adaptation-mitigation/
[6] http://www.theguardian.com/environment/2015/may/06/global-carbon-dioxide-levels-break-400ppm-milestone
[7] http://sealevel.climatecentral.org/uploads/ssrf/NJ-Report.pdf

at home and solutions will require local intervention. New Jersey cannot unilaterally control coal-power plants in Pennsylvania,[8] but we can address the local and state-based contributors of greenhouse gases, which will have a salutary effect. **We cannot do everything, but we must do something.**

Per a June 2014 report from the New Jersey Climate Adaptation Alliance (NJCAA), the threats facing New Jersey are:

- **Extreme storm** resulting in deaths, homelessness, dislocation, infrastructure damage, property destruction, significant lost economic activity, power outages (already 10 times worse than 20 years ago), inland flooding
- **Rising seas and heightened storm surges** leading to coastal flooding, community dislocation, beach erosion, infrastructure damage, loss of property and lives
- **Extreme heat** especially during summer months and in urban areas, where 95% of NJ residents reside, leading to increased deaths, increased pollution, health problems of particular threat to children and elderly, threats to agriculture, increased fires. The NJCAA notes that increased temperatures by mid-century will make New Jersey feel more like Birmingham, Alabama.[9]

Mitigation and Adaptation

Climate Change is a complex issue that demands complex solutions. In order to understand where to begin, many analysts define two approaches: **Mitigation** – "reducing emissions of and stabilizing the levels of heat-trapping greenhouse gases in the atmosphere" and **Adaptation** – "adapting to the climate change already in the pipeline."[10]

Particularly in the wake of Hurricane Sandy, focus in New Jersey has been on adaptation. This is a rational and productive response. The Fund's grants have supported work to rethink coastal planning, manage stormwater, address salt water intrusion and other water quality issues resulting from sea level rise, and to study the resiliency of NJ's forests. Public and private dollars have been devoted to resilient design, strategic buyouts, and improved emergency response. The NJCAA released in July 2014 a thorough report containing 48 recommendations for change.[11] There are many good ideas focused on adaptation.

Mitigation, on the other hand, has not yet been the focus of much investment or policy attention in New Jersey. There are several opportunities to engage in work on this front, with a

[8] It is worth noting, however, that New Jersey could have joined a coalition of eight Eastern states filing a petition with the USEPA in 2013 seeking to curb air pollution blowing in from Midwest and Southern coal-fired power plants but Governor Christie elected not to do so.

[9] http://njadapt.rutgers.edu/docman-lister/working-briefs/75-nj-vulnerabilities/file

[10] http://climate.nasa.gov/solutions/adaptation-mitigation/

[11] http://njadapt.rutgers.edu/docman-lister/resource-pdfs/120-resilience-preparing-new-jersey-for-climate-change-policy-considerations/file

particular focus on vulnerable communities that are already the most impacted by climate change and will be even more impacted in the future (air pollution, heat islands, etc.).

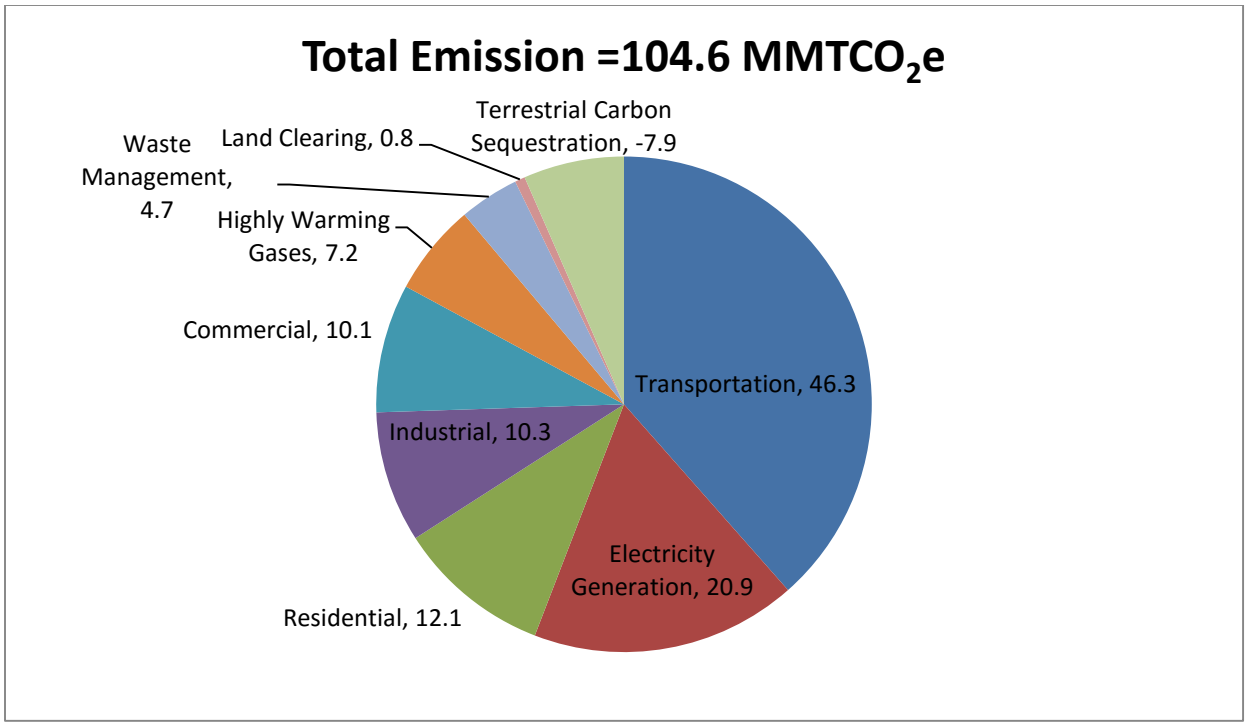
Greenhouse Gases

In March 2015, Rutgers Bloustein School and Rutgers Climate Institute issued the 2012 Update to New Jersey's Statewide Greenhouse Gas Emission Inventory, supplementing the most recent inventory conducted by the NJ Department of Environmental Protection (NJDEP) on Greenhouse Gas emissions for the year 2009. According to the 2015 report, the estimated emissions for 2012 were 104.6 million metric tons of CO_2 equivalents ($MMTCO_2e$), a 7% decline from the average emissions of the previous three years. This reduction sets NJ on course for meeting its first Global Warming Response Act (GWRA) target of returning to 1990 greenhouse gas levels by 2020, but not its second and more aggressive target of 80% reductions from 2006 levels (127 $MMTCO_2e$) by 2050. Achieving this target would require a 75% reduction from current levels.

Year	**$MMTCO_2e$**
1990	125.6
2006	127.0
2010	112.7
2011	111.7
2012	104.6
2020 (GWRA target = 1990 level)	125.6 (target)
2050 (GWRA target = 80% below 2006 level)	**25.4** (target)

The contributors of greenhouse gases in New Jersey are shown in the chart below. Figures measure million metric tons of CO_2 equivalents ($MMTCO_2e$), not percentages of a whole.[12]

[12] http://climatechange.rutgers.edu/docman-list/special-reports/354-2012-update-to-new-jersey-s-statewide-greenhouse-gas-emission-inventory/file



Note that carbon sequestration does have a salutary effect (-7.9 $MMTCO_2e$).

Note too that in New Jersey unlike the country as a whole, transportation is the largest source of carbon emissions.

CO_2 Emissions Source	**United States**	**New Jersey**
Electricity	37%	19%
Transportation	31%	**41%**
Industry	15%	9%
Residential & Commercial	10%	20%
Other	6%	11%

The largest increase in greenhouse gas emissions in New Jersey since 1990 has been the on-road transportation sector, caused by a combination of "consistent increase in vehicle miles

traveled each year"[13] and "leveling off in the fuel efficiency of the motor fleet," although increased fuel efficiency in recent years did lead to a modest reduction of emissions from gasoline and diesel vehicles between 2011 and 2012.[14]

Some proponents argue that all greenhouse gases are not equal and that natural gas is cleaner than other fossil fuels and thus can serve as a "bridge" to renewable energy. Although natural gas produces 50% to 60% less CO_2 when combusted in a new, efficient natural gas power plant compared with emissions from a typical new coal plant, this calculation changes when one considers the full life cycle of the production and transmission of natural gas. When natural gas is drilled and extracted from wells and transported in pipelines it leaks methane, a far more potent global warming gas than CO_2. These so-called "fugitive" methane emissions range from 1% to 9% of total life-cycle emissions. Whether natural gas has lower life- cycle greenhouse gas emissions than coal and oil depends on the assumed leakage rate as well as other factors such as energy conversion efficiency, with recent studies showing that leakage rates must be kept under 3% to have lower life-cycle emissions than new coal plants.[15]

Fossil Fuel Infrastructure

The United States' domestic fossil fuel energy production increased from 69% in 2005 (an historic low) to 84% in 2013, largely as a result of new domestic oil and gas production.[16] In the United States, hydraulic fracturing ("fracking") has resulted in major new supplies of natural gas in the Marcellus and Utica regions (Pennsylvania, New York, West Virginia, Ohio); the Marcellus Shale alone accounted for 36% of the nation's natural gas production in May 2015. Drilling in the North Dakota Bakken region has yielded new sources of crude oil, resulting in North Dakota and Texas now producing 50% of the nation's oil supply.[17] Top domestic and oil gas producing regions in the U.S. are now Bakken, Eagle Ford, Haynesville, Marcellus, Niobrara, Permian and Utica (see map below).[18]

[13] The most recent Federal Highway Administration data released shows that total vehicle miles traveled (VMT) in New Jersey rose just under 1 percent from 2011 to 2013, to a total of nearly 73.8 billion miles. http://www.njspotlight.com/stories/15/02/12/commuting/

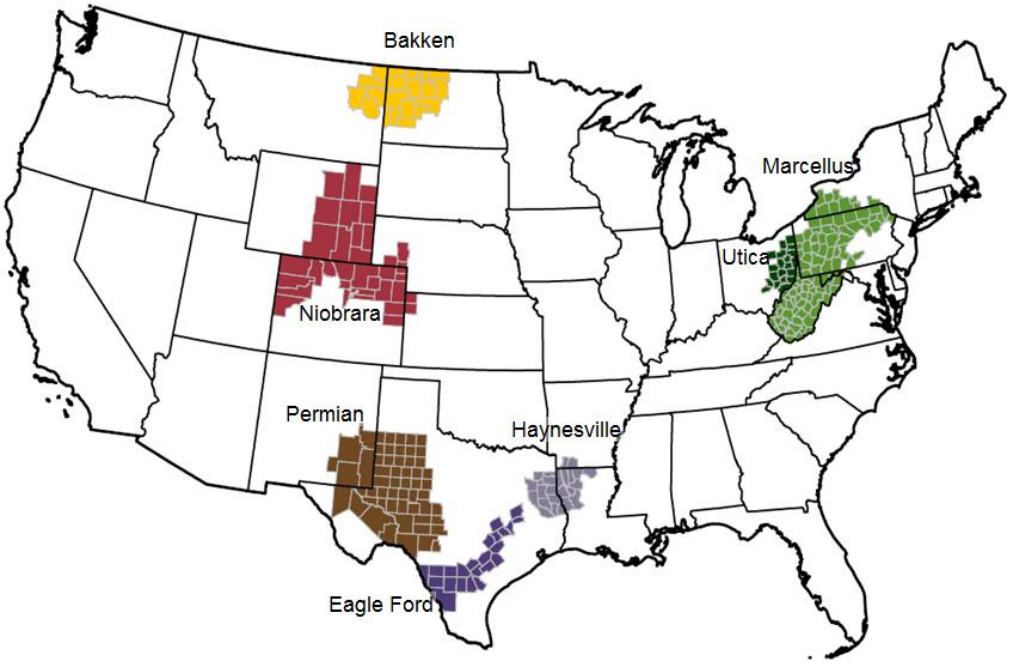
[14] http://climatechange.rutgers.edu/docman-list/special-reports/354-2012-update-to-new-jersey-s-statewide-greenhouse-gas-emission-inventory/file

[15] http://www.ucsusa.org/clean_energy/our-energy-choices/coal-and-other-fossil-fuels/environmental-impacts-of-natural-gas.html#.VWitREYw1yx

[16] http://www.eia.gov/todayinenergy/detail.cfm?id=16511

[17] http://www.eia.gov/todayinenergy/detail.cfm?id=16931

[18] http://www.eia.gov/petroleum/drilling/



While Pennsylvania has offered strong support to the oil and gas industry to initiate operations there, backlash resulting from concerns over climate change, water pollution, earthquakes induced by drilling, and other environmental and human consequences has caused other localities to try to ban these efforts, with mixed success. Governor Cuomo, citing unacceptable public health risks, banned hydraulic fracturing in New York in December 2014, becoming the first state to do so.

Others raise objections to the deadly equation of fossil fuel extraction. Bill McKibben, founder of 350.org, wrote a groundbreaking article in *Rolling Stone* calculating that if all the oil and gas that is currently in reserve were burned, 2,795 gigatons of CO_2 would be released into the atmosphere, about five times the 565 gigatons of CO_2 that scientists say must be the upper limit released to keep to 2°C.[19]

The dramatic increase in new oil and gas production has created a demand for new pipelines – as well as increased train transport – to carry the oil and gas across the country and, in some cases, overseas for export. In addition to the 1,520 miles of transmission pipelines already crossing New Jersey, the state faces over a dozen new proposals for oil and gas pipelines, including: the Pilgrim Pipeline proposed to carry highly volatile Bakken shale oil from Albany, NY to Linden, NJ; the PennEast pipeline carrying hydraulically fractured natural gas from Pennsylvania to a location north of Trenton, NJ; and the South Jersey Gas Pipeline carrying natural gas through the protected Pinelands to northern Cape May County.

The debates are varied. Some proponents note the air quality benefits that come from natural gas-based power generation over coal- fired plants. Opponents raise concerns from potential

[19] http://www.rollingstone.com/politics/news/global-warmings-terrifying-new-math-20120719

damage to ecologically sensitive lands and habitat (Highlands and Pinelands) to immediate public safety and health threats (explosions resulting from volatile Bakken crude oil, ruptures of natural gas transmission lines). Others oppose in principle any building on conserved lands.

The most serious risk of all, however, is that investment in fossil-fuel-bearing infrastructure will lock New Jersey into a future of greenhouse gas emission contributing to continued climate disruption.

Related Urban Environmental Issue: Air Quality

In addition to the greenhouse gases linked to climate change, the burning of fossil fuels creates other air pollutants of concern, known as co-pollutants (some of which also contribute to climate change). These co-pollutants include: air toxics, a blanket term for a variety of carcinogenic air borne chemicals; particulate matter ($PM_{2.5}$) found in vehicle exhaust, particularly diesel trucks, and industrial emissions; and ozone (O_3) or smog, formed through the combustion of oxygen with volatile organic compounds and sunlight. These co-pollutants create or exacerbate serious public health problems: asthma, cardiovascular disease, diabetes, and premature death.[20] In 2012, EPA designated the entire state of New Jersey in nonattainment (noncompliance) for ozone air quality standards (The American Lung Association in its *State of the Air 2015* report, similarly gave 13 of NJ's 15 counties that measure air quality a grade of D or F for ozone pollution). New Jersey residents are the victims of ozone/smog pollution from power plants in the upwind states of Pennsylvania, Ohio, and West Virginia, which cause up to 30% of the smog pollution reported by NJ air quality monitors, and substantially more when these plants don't operate their pollution control equipment.[21]

New Jersey residents also suffer from particulate matter pollution, although the problem is more localized. In 2013 EPA upgraded NJ to attainment status for particulate matter for all 21 counties for the first time in decades, but NJ's urban areas are still hotspots of pollution. People in places such as Newark, Elizabeth, and Linden (disproportionately low-income and non-white) are disproportionately affected by high rates of asthma (24% of Newark's children suffer from asthma), cardiovascular disease and other adverse health effects.[22,23] According to a 2011 national study, *Sick of Soot*,[24] prepared by the American Lung Association, Clean Air Task Force, and EarthJustice, New Jersey's two metropolitan areas are among the top five nationally that

[20] http://loe.org/shows/segments.html?programID=14-P13-00002&segmentID=5

[21] A May 17, 2015 article in The Bergen Record, "NJ Air Quality Takes a Hit" reported that power companies operating coal-fired power plants have been turning off pollution control equipment between 2009 and 2013 because it is cheaper to do so under current EPA pollution credit rules than to run the equipment, resulting in massive increases in nitrogen oxide emissions that cause smog.

[22] http://www.nj.gov/dep/baqp/aas.html

[23] In recognition of this problem, the EPA recently donated air monitors to Ironbound Community Corporation to measure localized air quality.
http://www.nj.com/essex/index.ssf/2015/03/newark_to_monitor_air_quality_with_150k_epa_sensor.html

[24] http://www.catf.us/resources/publications/view/159

would benefit the most from stronger EPA $PM_{2.5}$ standards (New York #2, Philadelphia #4). These air pollutants generally come from the same sources as those generating greenhouse gas emissions, and thus reducing pollution from these sources (e.g., power plants, trucks) would "kill two birds with one stone" by both improving air quality and reducing the greenhouse gas emissions causing climate change.

Impediments to Action

To be sure, change is not and will not be easy. The challenges to effectively addressing climate change and air pollution are many and include:

- global economy and energy infrastructure based upon the burning of fossil fuels and the consumer habits and cultural practices that feed the flames;
- a jaded, disengaged public that can be effectively engaged in local not-in-*my*-backyard (NIMBY) fights but is more difficult to engage on broader clean energy fronts;
- an extremely powerful and well-financed oil and gas industry that is invested in the status quo including direct investment in elected officials;
- slow response of disparate groups (environmental, business, anti-poverty, etc.) to recognize the common threat that climate change poses to humanity and the ecosystems upon which humanity depends; narrow framing of climate change as an environmental issue; and
- overwhelming existential paralysis that afflicts too many leaders.

Challenges specific to New Jersey include:

- predominantly suburban, sprawling development patterns that increase reliance on the car as the dominant mode of transport;
- opposition by the current Administration to clean energy and pollution reduction policies (including raiding clean energy funds, withdrawing from RGGI, failing to join other regional efforts to curb pollution, disinvesting in public transit, opposing a gas tax, failing to push clean air policies at the Port, etc.);
- fiscal crises that tip preferences to quick fixes rather than sustained investment;
- multiple governmental structures, making it easy to pass the buck along; and
- unfocused leadership and weak resident support for the policies and practices needed to facilitate change.

Policy Context in New Jersey

New Jersey has taken various steps over the years to address climate change, including adoption of statewide laws and policies, coordinated regional responses, and implementation of federal requirements. An overview of major initiatives follows.

Global Warming Response Act. Under previous administrations, NJ was recognized as a leader in adopting progressive laws and policies to advance clean energy and reduce greenhouse gas emissions. These include the Global Warming Response Act of 2007, enacted by Governor Corzine, which called for reducing greenhouse gas emissions to 1990 levels by 2020 and to 2050 levels that are 80% less than 2006 levels. The Act called for NJDEP to issue strategies to achieve these goals, which it did in December 2009: *Meeting New Jersey's 2020 Greenhouse Gas Limit: New Jersey's Global Warming Response Act Recommendations Report*.[25] Unfortunately, the report was issued in the waning days of Governor Corzine's administration, and under the current administration these recommendations have been largely ignored or repudiated. This is reflected in recent data that show that even though NJ is still making substantial progress on solar installations, its rankings have dropped from 2nd to 6th in the nation.[26] In the area of energy efficiency, NJ has dropped to 19th in the nation from its previous ranking of 8th in 2006.[27]

Energy Master Plan. Similarly, New Jersey adopted an aggressive Energy Master Plan in 2008 under Governor Corzine that focused on renewable energy and energy efficiency measures in order to increase energy security, decrease consumer costs, and reduce greenhouse gas emissions. The Plan set a Renewable Portfolio Standard (RPS) of 30%, which was subsequently reduced to 22.5% in a watered-down version of the Energy Master Plan adopted in 2011 by Governor Christie. Currently, less than five percent of NJ's energy comes from renewable sources, with the rest coming from nuclear (50%), natural gas (31%), and coal (15%). Nuclear power, though not renewable, does not emit greenhouse gases. However, one of the state's four reactors (Oyster Creek) is due to be shut down by 2020. Senator Bob Smith and other state legislators are drafting a new bill that would set aggressive new targets for renewable energy (80% renewable by 2050) but sponsors acknowledge that the bill is likely to be vetoed by Governor Christie.

Regional Greenhouse Gas Initiative (RGGI). RGGI was the first market-based regulatory program in the United States to reduce greenhouse gas emissions. RGGI is a cooperative effort among the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont to cap and reduce CO_2 emissions from the power sector. NJ signed the original Memorandum of Understanding to join RGGI in December 2005 (and it was launched in 2008), but Governor Christie unilaterally withdrew NJ from RGGI in 2011.

The program has seen successes. Participating RGGI states have collectively reduced their carbon emissions by 39% from 2005 to 2012. States sell nearly all emission allowances through auctions and invest proceeds in energy efficiency, renewable energy, and other consumer benefit programs. An April 2015 report quantified the benefits of RGGI to the region through

[25] http://www.nj.gov/dep/sage/docs/njgrwa_final_report_exec_summary_dec_2009.pdf
[26] http://www.seia.org/research-resources/2014-top-10-solar-states
[27] http://aceee.org/state-policy/scorecard

2013: more than $1 billion in RGGI proceeds invested in energy efficiency, clean and renewable energy, greenhouse gas abatement, and direct bill assistance. 3.7 million households and 17,800 businesses have participated, 3,700 workers have been trained, $395 million has been saved in energy bills to-date, 1.9 million megawatt hours saved, 1.3 million short tons of CO_2 emissions were avoided, and 245,000 equivalent cars were taken off the road.[28]

As a result of litigation filed by Environment NJ and Natural Resources Defense Council (NRDC), represented by Columbia University's Environmental Law Clinic, The Appellate Division of the NJ Superior Court issued a decision in March 2014 finding that Governor Christie did not have the authority to withdraw from RGGI without rulemaking and that NJDEP must adopt regulations formally withdrawing NJ from the program. Last summer, NJDEP proposed rules to do so; these rules are pending. [Note: The NJDEP adopted rules to withdraw NJ from RGGI in August 2015.]

Federal Clean Air Act and Clean Power Plan. The U.S. Environmental Protection Agency's (EPA) Clean Power Plan, proposed in June 2014, would, for the first time ever, limit carbon pollution from existing power plants. EPA is using its authority under section 111 of the 1990 Clean Air Act to issue standards to address carbon pollution from new and existing power plants, including modifications of those plants. This is the same section of the Act that already regulates air pollution from stationary sources (including particulate matter, ozone (smog), carbon monoxide, sulfur oxides (causes acid rain), nitrogen oxides (causes acid rain), and lead). EPA is expected to finalize rules for the Clean Power Plan for Existing Power Plants and the Carbon Pollution Standard for New Power Plants in the summer of 2015. (It is in the midst of reviewing 3.9 million comments received on the proposal.) [Note: EPA adopted the Clean Power Plan in August 2015.]

Under the proposed rule, New Jersey is required to achieve a 43% reduction in carbon emissions from power plants by 2030. [Note: This standard was eased to a 26% reduction in the final version of the rule adopted in August 2015.[29]] States are encouraged to develop their own compliance plans (State Implementation Plans) and have one year to do so (unless they are part of a regional collaborative, in which case they have 2 years) –until summer 2016. The federal government will be issuing a Federal Implementation Plan for states that do not create their own plans. NJDEP on behalf of the State of NJ, came out against the federal Clean Power Plan in November 2014, calling the rules "fundamentally flawed." While we don't yet know whether New Jersey will prepare its own State Implementation Plan or revert to a federal plan, NJDEP's public comments suggest that NJ will resist complying with this new federal mandate.[30] [Note: In October 2015, New Jersey joined a lawsuit with 23 other states challenging the Clean

[28] http://www.rggi.org/docs/ProceedsReport/Proceeds-Through-2013-FactSheet.pdf
[29] http://www.c2es.org/federal/executive/epa/carbon-pollution-standards-map
[30] http://www.state.nj.us/dep/111d/

Power Plan.[31] Nevertheless, NJDEP is in the process of crafting a State Implementation Plan (SIP) to meet the new federal rule requirements.]

Lessons from Beyond New Jersey's Borders

State Policy Initiatives. California is considered the leader nationally (and globally) for its aggressive greenhouse gas reduction policies. In 2006 California adopted the Global Warming Solutions Response Act, which sets a goal of reducing GHG emissions to 1990 levels by the year 2020 and achieving an 80% reduction from 1990 levels by 2050 (similar to New Jersey's 2007 GWRA goals). This is the first state in the country to mandate an economy-wide emissions cap that includes enforceable penalties. California has an online Climate Change Portal for information and resources about climate change and has created a Climate Action Team of state department heads to produce reports and develop/implement policy.

California adopted a cap-and-trade program in 2012; compliance began in January 2013.[32] The development of this program included a multi-year stakeholder process and consideration of potential impacts on disproportionately impacted communities, although the cap-and-trade program was opposed by environmental justice advocates and remains controversial among the environmental justice community.[33] In an effort to address those concerns, at least 25% of cap-and-trade proceeds must be for projects that benefit disadvantaged communities and at least 10% must be allocated to projects located in disadvantaged communities. 100% of funds must go to projects that reduce emissions.

Two major initiatives that have been funded through the program and were announced in February 2015 are: 1) the new $125 million Transit and Intercity Rail Capital Program to help modernize and integrate California's bus and rail systems to increase transit ridership and reduce greenhouse gas emissions that cause climate change; and 2) a new $120 million Affordable Housing and Sustainable Communities Program to fund projects that result in the reduction of greenhouse gas emissions and vehicle miles travelled (VMT) and increase accessibility of housing, employment centers, and key destinations through low-carbon transportation options such as walking, biking, and transit. The program is now installing free solar on low-income people's homes, with 1,600 installations underway.

To date, the cap-and-trade program has raised $1.6 billion, far exceeding expectations. Another $3.9 billion is anticipated to be raised as a result of an amendment to the law bringing transportation fuels into the program. The program has been so successful that lawmakers are

[31] http://www.nj.gov/dep/newsrel/2015/15_0095.htm
[32] http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm
[33] Environmental justice advocates have opposed cap-and-trade programs because of concerns that vulnerable communities (populated by poor people and people of color) currently affected by pollution would continue to be impacted because offending industries could buy their way out of obligations to reduce those emissions, leaving urban communities located near industry potentially vulnerable to increased levels of pollution.

racing to figure out how to spend all the funds.[34] Most recently in his 2015 State of the State, Governor Brown proposed three new climate goals: 1) cut petroleum use in half by 2030; 2) 50% of state's electricity will come from renewable resources by 2030; and 3) double energy savings in existing buildings & develop cleaner heating fuels by 2030.[35] With regard to the second goal, CA seems well on its way. 4,316 megawatts of solar were installed in the State in 2014, enough to power more than 1 million homes; in this one year, CA installed more solar than the entire country did between 1970 and 2011.[36]

Hawaii and Washington State are also pursuing aggressive clean energy targets. Hawaii's legislature recently set a bold goal of 100% renewable energy by 2045; Hawaii already secures 23% of its current energy from renewable sources.[37] Washington Governor Inslee proposed that state's own version of a carbon trading system in December 2014, with proceeds proposed to go to an Earned Income Tax Credit to benefit low-income households; that proposal is facing opposition in the WA legislature although recent rosy revenue reports from CA's program, upon which WA's proposal is closely modeled, may alter that dynamic.

According to the Center for Climate and Energy Solutions (C2ES, formerly Pew Center on Global Climate Change), a respected independent national think tank on climate policy, 20 states have adopted policies to reduce greenhouse gases. In the Northeast and Midatlantic, these include New Jersey, Maryland, New York, Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, and Maine.

Regional Policy Initiatives. Eleven states plus DC participate in the Transportation & Climate Initiative (TCCI) of the Northeast & Midatlantic States, launched in 2010, which seeks to develop the clean energy economy and reduce greenhouse gas emissions in the transportation sector. Funders include Rockefeller Brothers Fund, Emily Hall Tremaine Foundation, Rockefeller Foundation, Oak Foundation, Barr Foundation, and Surdna Foundation. While NJ initially joined this collaborative under Governor Christie, it was the only state in the collaborative not to sign on to the TCCI's Northeast Electric Vehicle Network, launched in 2012, which promotes clean vehicles and fuels and facilitates planning and deployment of electric vehicle (EV) charging stations and related infrastructure throughout the Northeast and Mid-Atlantic states. [Note: Most recently, in November 2015, New Jersey fell even further behind in this work when it opted out of a regional effort to be pursued by five northeastern states and Washington DC to develop market-based policies to cut greenhouse gas emissions from transportation.[38]] TCCI

[34] http://fusion.net/story/140864/californias-cap-and-trade-program-has-generated-so-much-money-that-the-state-doesnt-know-what-to-do-with-it/

[35] http://www.arb.ca.gov/html/2030climatecommitment.htm

[36] http://www.seia.org/research-resources/2014-top-10-solar-states

[37] http://magazine.good.is/articles/hawaii-to-go-entirely-renewable-energy

[38] http://www.georgetownclimate.org/five-northeast-states-and-dc-announce-they-will-work-together-to-develop-potential-market-based-poli

areas of focus include clean vehicles & fuels, sustainable communities, freight efficiency, and information & communication technology. TCCI's greatest accomplishment appears to be in the area of EV deployment; EV ownership has increased four-fold and the number of EV charging stations has tripled in the region since the Network was launched in 2012. New Jersey could benefit from more active engagement in this work.

Local Policy Initiatives. Local governments are also moving forward on aggressive local climate action and clean energy planning. New York State, for instance, encourages local climate action plans through its Climate Smart Communities Initiative, which provides technical assistance and other support to municipalities seeking both to reduce greenhouse gas emissions and adapt to climate change. In New York City, PlaNYC, first created by Mayor Bloomberg in 2007 with the help of 25 City agencies and non-profits, is a well-known example of local climate planning. The plan's goal was to reduce greenhouse gas emissions 30% by 2030 by avoiding sprawl, using clean energy, making buildings more efficient, and expanding sustainable transportation. Mayor de Blasio released *One City: Built to Last* in 2014, in which he established a new goal of reducing emissions by 80% by 2050. To do this, the Mayor focuses on "transforming buildings for a low-carbon future" by promoting energy efficiency and renewable sources of energy for both built and future buildings.

San Francisco was another early leader in local climate action planning, creating its first climate action plan in 2004 as part of its commitment to the *U.S. Conference of Mayors Climate Protection Agreement* (to date, signed by 1060 mayors, including over 100 NJ Mayors). San Francisco adopted an update to its Climate Action Strategy in 2013, which addresses local climate impacts, a greenhouse gas emissions inventory, energy use in buildings, transportation, zero waste, urban forest, and municipal operations.

Nonprofit Sector Initiatives. There are notable examples of non-profit organizations around the country that are engaged in efforts to reduce greenhouse gas emissions while also seeking to achieve other positive benefits such as job creation, reduced energy bills, reduced air pollution levels, more livable urban communities, etc. Within the umbrella of public policy, tactics vary, ranging from research and analysis to community organizing and coalition building. A few highlights are provided below:

- Green for All is a national organization founded by Van Jones (former green jobs advisor to President Obama) that seeks to "build an inclusive green economy strong enough to lift people out of poverty." It brings together individuals and groups that don't typically work together, ranging from national organizations (from environmental groups like 350.org and the Sierra Club to civil rights groups like the NAACP) to local community and business leaders (including companies like Mosaic and Volt Energy). Its main focus is building a network of activist leaders who lead green businesses and social ventures.

- Los Angeles Alliance for a New Economy (LAANE) identifies strategies to advance the climate-resilience priorities of Los Angeles' lower-income and community-of-color residents, including increasing access to solar power while ensuring that low-income customers can benefit from savings in an equitable manner; addressing urgent water-conservation and water-infrastructure needs; further expanding access to energy-efficiency retrofits; and advocating for enhanced public transportation.
- Alliance for Jobs and Clean Energy is a coalition of environmentalists, businesses, public health, unions, and other organizations working in Washington State through education and public policy advocacy to reduce global warming pollution and strengthen the state's economy.
- Business Council on Climate Change is a network includes more than 100 San Francisco-based organizations from the public, private, non-profit, and philanthropic sectors. Its model is to identify parts of the climate change problem that call for collaborative action; bring powerful but traditionally isolated institutions together around the same table to develop model solutions; and measure the impact of solutions over time.
- Southern Alliance for Clean Energy works to "promote responsible energy choices that create global warming solutions and ensure clean, safe and healthy communities throughout the Southeast." Strategies include: 1) work to find clean energy solutions to help reduce the impact of climate change; 2) identify problems and create effective, real-world solutions; 3) build bridges among environmental, business, agricultural and governmental interests; 4) work directly with diverse stakeholders and industries on energy issues affecting the region; 5) promote policy change through education and outreach to improve public health, the environment and the economy.
- Transportation for MA Coalition is a diverse coalition of organizations working together to create safe, convenient, and affordable transportation for everyone. The coalition advocates for transportation funds to be spent fairly and wisely, for transportation decisions that are transparent and accountable, and to ensure that MA's transportation system has sufficient resources to meet tomorrow's needs. Note: Although their work is not climate-limited, much of what they advocate for (public transit investment, fix it first, etc.) would support emission reductions from the transportation sector.
- Interfaith Power and Light (IPL)'s mission is "to be faithful stewards of Creation by responding to global warming through the promotion of energy conservation, energy efficiency, and renewable energy." California IPL developed a successful model that engaged hundreds of congregations, educated thousands of people of faith about the moral and ethical mandate to address global warming, and helped pass California's landmark climate and clean energy laws. Building on California's success, this model has now been

adopted by 38 sister state affiliates, and IPL is working to establish programs in every state (PA and NY have chapters but NJ does not).

- EarthFix is an innovative public media partnership of Pacific Northwest public radio stations, creating media across multiple platforms, helping citizens investigate environmental topics in their own backyards and to explore how local actions intersect with national issues.

Survey of Fund Grantees and Partners

We surveyed 44 Fund grantees and partners to understand what they were doing on issues related to climate change. The survey asked grantees how climate change impacts their work, how the issue fits into their policy goals, and its level of priority for their organization. Staff received 37 responses, and grantees ranked the importance of the issue to their organization from a low of 1 to a high of 5, with a median response of 3 and a mean of 2.84. Only four respondents said climate change was their top priority (rank of 5).

Investment Opportunities

After significant and far-ranging research, including consulting with experts, reading reports, and surveying the field, we believe there are five avenues for investment in climate mitigation policy work:

1. Climate action **planning** & greenhouse gas reduction (greenhouse gas emission targets, climate action plans etc.)
2. **Energy** sector (decoupling so that utilities are rewarded for reducing energy usage, energy efficiency, net metering, public benefit funds)
3. **Transportation** sector (electric vehicles, policies to reduce emissions from medium and heavy vehicles, biofuels, low carbon fuels, public transportation)
4. **Building** sector (appliance efficiency, PACE programs, residential & commercial energy codes, government building efficiency standards)
5. Galvanizing **public support and action**, through education, advocacy, and organizing. (intersections with public health)

Climate Action Planning. Although New Jersey was at the forefront of state planning with the 2007 Global Warming Response Act, we have lagged behind other states, largely due to missing gubernatorial leadership. There is an opportunity to tee up a set of policy issues to be tackled during the next administration and, in the meantime, to build on the examples of New York City and elsewhere to advance climate action planning at the municipal level. Needed are (1) research about potential solutions, (2) priorities for policy action, and (3) plans for implementation.

Energy Sector Policy. Strategies in this sector are threefold: (1) shift electricity production from dirty to clean energy sources (from fossil fuels to renewables) with the concomitant economic

boost that could be generated by innovation and new technology, (2) encourage large-scale energy efficiency and conservation, and (3) stop and slow the investment in dirty energy infrastructure.

Transportation Sector Policy. New Jersey is distinctive for having the largest contribution of greenhouse gases come from the transportation sector. There is clear need to reduce the use of fossil fuels to power vehicles, via increased energy efficiency, support for electric vehicles, expansion of public transportation, cleaning up diesel trucks, and changes in practices to reduce the number of vehicle miles traveled.

Building Sector Policy. We know that the commercial, industrial, and residential sectors contribute 29% of the state's greenhouse gas emissions. This is an important sector, but one in which there is at present little activity. Some can be addressed through municipal action planning (reducing the carbon emissions of government buildings, for example) or through innovative financing such as NJ-PACE. However, financing and logistics are not the only impediments to action; another significant block is lack of public will. People just aren't motivated to make changes. We need to shift the default from inaction to action, and launch public mobilization.

Public Support and Action to Advance Policy Change. Perhaps the biggest gap is the space between the urgency of the problem of climate change and the will of decision makers to act. This is where galvanizing public support must come in. Opinion surveys demonstrate regularly that climate change is a top priority for New Jersey residents, but motivation to act individually or collectively is limited. For example, a 2013 Stanford public opinion poll found that 86% of NJ residents surveyed believed that global warming was a "serious problem" and claimed support for policy change at the 72% to 84% level for various options. At the same time, only 12% of the same respondents agreed that the issue was "extremely important personally (and is likely to influence voting)."[39] These finding suggest that the problem is not lack of information (62% considered themselves "highly knowledgeable") or absence of strong policy recommendations. Rather, it is an absence of resolve and motivation.

It is important to note that some segments of the population do prioritize action on climate change. Recent polling by the pollsters Latino Decisions found that conservation is a bi-partisan and cross-generational priority for Latinos. Ninety percent of registered Latino voters nationally believe it is important for government to address climate change. In a ranking of priority issues, combating climate change ranks second only to immigration reform, and above health care, education, and abortion. Pollsters learned that Latinos care about these issues out of a sense of duty to the next generation and concern for communities in Central and South America and the Caribbean that are already facing dangerous and extreme weather.

[39] http://democrats.energycommerce.house.gov/sites/default/files/documents/Stanford-Climate-Polling-New-Jersey-2013.pdf

Furthermore, there are promising opportunities to support movements, including parents concerned about their children's health, urban CDCs and neighborhood associations addressing the impact of extreme weather on health and well-being, faith communities seeking alignment between their spiritual and worldly practices, and youth leaders.

Related Ideas Not Explored Herein

- Mission-related investing opportunities, including targeted investment in clean energy projects and shift to green investment funds.