

**REPORT TO GOVERNOR MARKELL ON A COMPREHENSIVE ENERGY/CLIMATE
CHANGE PLAN FOR DELAWARE**

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Edited by Chad Tolman

2/24/12

I. EXECUTIVE SUMMARY

With miles of coastline and large-expanses of low-lying areas, with the lowest average elevation of any state, Delaware is particularly vulnerable to the impacts of climate change – especially sea level rise and coastal storms. With this vulnerability comes responsibility. Delaware’s per capita energy consumption and greenhouse gas emissions currently exceed those of neighboring states and the national average.

Leadership has proven to be the critical component in the development of sound energy and climate policy. Through robust executive leadership, Delaware has implemented an impressive Renewable Portfolio Standard for electrical energy and has made significant changes to the fuels that generate electricity in the state. Reduction in energy demand through efficiency has made valuable headway, particularly through initiatives of the Delaware Energy Office and the Sustainable Energy Utility. Opportunities for innovation in renewable energy and efficiency have swelled, and Delaware has become a magnet for green jobs and industries. Notwithstanding this substantial progress, a long-range and comprehensive energy and climate change plan has yet to be implemented.

On June 24, 2011 a coalition of environmental groups in Delaware sent a letter to Governor Markell asking him to exercise leadership in the development and implementation of a comprehensive energy and climate change plan that would reduce greenhouse gas emissions and make Delaware “more resilient to the dangers of climate change for generations to come.” Most of these groups met with Governor Markell on February 1, 2012 to present information about the importance of proceeding with this effort. This report documents this endeavor, and provides a foundation for moving forward in the long-range comprehensive energy and climate change planning process.

The proposed plan would incorporate the following components:

- attract renewable energy businesses and promote green job growth
- greenhouse gas reduction targets and timetable exceeding or at least comparable to what is in place in other states.
- renewable energy and efficiency initiatives
- energy reduction plan to achieve energy self-sufficiency and carbon neutrality in Delaware’s built environment by 2030
- land-use planning that directs growth toward growth zones outside environmentally sensitive areas, concentrating growth in core areas (saving scarce infrastructure dollars and avoiding unnecessary greenhouse gas emissions).
- adaptation planning for sea level rise
- do full life-cycle analyses with costs of externalities in comparing energy sources
- energy/climate education and outreach
- energy workforce training strategy
- social and economic justice
- public health and safety

The development of such a comprehensive energy and climate change plan would help to insure the quality of life for future Delawareans.

II. BACKGROUND

The first meeting of the LWVDE Energy/Greenhouse Gas Subcommittee - whose work led to the comprehensive energy/climate change plan – took place in Dover on Aug. 30, 2010. Subsequent monthly meetings were held by conference call. A 4-page summary report (**LWVDE Energy/Greenhouse Gas Background Information Summary, Appendix I**), listing the members of the subcommittee, was prepared and posted on the League Studies page at <http://lwvdelaware.org> in February 2011, along with a more detailed 39-page **Supplementary Material for Energy/GHG Consensus Question 2011** with references, tables and figures. It can be downloaded from the same website page.

A letter sent to Governor Markell on June 24, 2011 (**Appendix II**) summarized the essential components of a comprehensive energy/climate change (E/CC) plan for Delaware and listed many supporting organizations and individuals.

In January 2012, Peggy Schultz, a member of the E/GHG Subcommittee, assembled information on the GHG emission reduction targets set by other states (**Appendix IV**). We are grateful for her contribution. One of the leading states in adopting and carrying out a comprehensive plan is New York. It published an Interim Report in 2010.¹

III. MEETING OF FEB. 1, 2012 WITH GOVERNOR MARKELL

The meeting with Governor Markell to urge him to adopt a comprehensive E/CC plan for Delaware was held in the Carvel State Building on Feb. 1. The list of organizations and individuals attending is shown in **Appendix III**. In addition to the governor, officials from the administration included Thomas McGonigle (Chief of Staff), Brian Selander (Chief Strategy Officer), Secretary Collin O'Mara (DNREC), and Carolyn Snyder (DNREC, Director, Division of Energy and Climate). After brief comments by the governor and seven members of environmental and religious organizations, there were about 15 minutes of comments by the governor and members of the audience.

¹ See **New York State Climate Action Plan Interim Report** - November 9, 2010. At: <http://nyclimatechange.us/InterimReport.cfm>

WRITTEN COMMENTS OF SPEAKERS

1. Overview, GHG Emission Targets and Vulnerability to Sea Level Rise – Chad Tolman

Governor Markell,

Thank you for the opportunity to meet with you. We also want to thank you for all you have already done to promote a green and prosperous economy, recognized by your award from the American Council for an Energy Efficient Economy. Your commitment to environmental protection and to dealing with energy and climate change is indicated by your hires of three outstanding individuals – Secretary O’Mara, Carolyn Snyder and Tom Noyes – and by your refusal to agree to weak environmental regulations on fracking in the Delaware River Basin. Now we are asking you to adopt a comprehensive energy/climate change plan for Delaware. In your State of the State Address you emphasized the importance of leadership in difficult times. We are urging you to make Delaware a leader among the states in developing a comprehensive plan and in reducing our per capita GHG emissions from all sources – electricity generation, buildings and transportation. A key part of achieving that leadership is a set of ambitious but realistic emission targets and a timetable for achieving them. What other states are doing will be addressed by the next speaker, and is summarized in Appendix IV.

There are some compelling reasons for adopting a comprehensive plan. Though Delaware is small – only 0.3% of the U.S. population – if it can show that we can be an economic success by becoming a green leader, we can convince other larger states to join in, and maybe get the whole country to follow us.

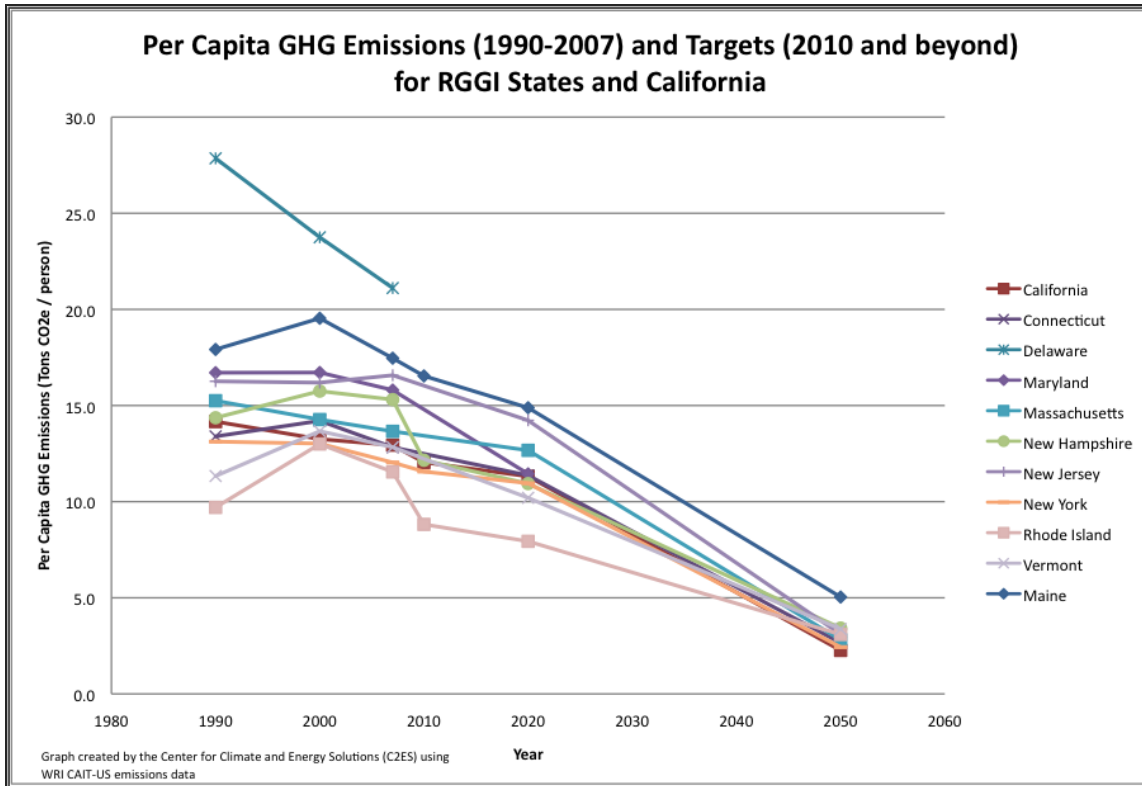
We are called to leadership, and here is why. Delaware is unusually vulnerable to climate change – and especially sea level rise.² We have the lowest average elevation of any state in the country – only about 60 feet. Since the beginning of the Industrial Revolution the global average surface temperature has increased about 1.5°F. ***That doesn’t sound like much, but it’s enough – based on Earth’s climate history - to eventually raise sea level 50 feet and inundate half of the state.*** Sea level at Lewes rose only 13 inches during the past century only because it takes a long time to get heat deep into the oceans and to melt the ice near the poles. In the meantime, ***GHG emissions, global warming, ice loss and sea level rise are all accelerating.*** The impacts on Delaware will be immense. Even 40 inches (1 m) of SLR could inundate 3% of our homes and most of our wetlands and beaches.³ ***We have to become a leader if we are to save our state!***

² Chad Tolman, **Rising Seas and Stronger Storms: Delaware’s Response in the Face of Uncertainty** and references in it, presented to the Delaware Sea Level Rise Advisory Committee Feb. 15, 2011. At: <http://chadtolman.com/risingseas.html> or <http://www.dnrec.delaware.gov/coastal/Documents/SLR%20Advisory%20Committee/Meeting%204%20Feb.%2015%202011/TolmanSLRAdapt021511.pdf>

³ **Progress Report of the Delaware Sea Level Rise Advisory Committee**, published Nov. 15, 2011. At: <http://www.dnrec.delaware.gov/coastal/Documents/SLR%20Advisory%20Committee/Finalized%20Documents/SLRProgressReportFinalNov2011.pdf>

2. Tracking and Targeting Greenhouse Gas Emissions – John Sykes

Delaware has made great environmental progress since January of 2009: the cleanup of the Indian River Power Plant, increasing energy efficiency standards on new buildings, and a stronger Renewable Energy Portfolio Standard, to name a few. The groups represented in this room, along with many others, have stood shoulder to shoulder with this administration in support of a safe environment, progressive environmental legislation and the creation of a green energy economy. Sharing a concern with this administration for a healthy planet for future generations, we all believe that we must set concrete targets and a timetable for the reduction of greenhouse gas (GHG) emissions in Delaware.

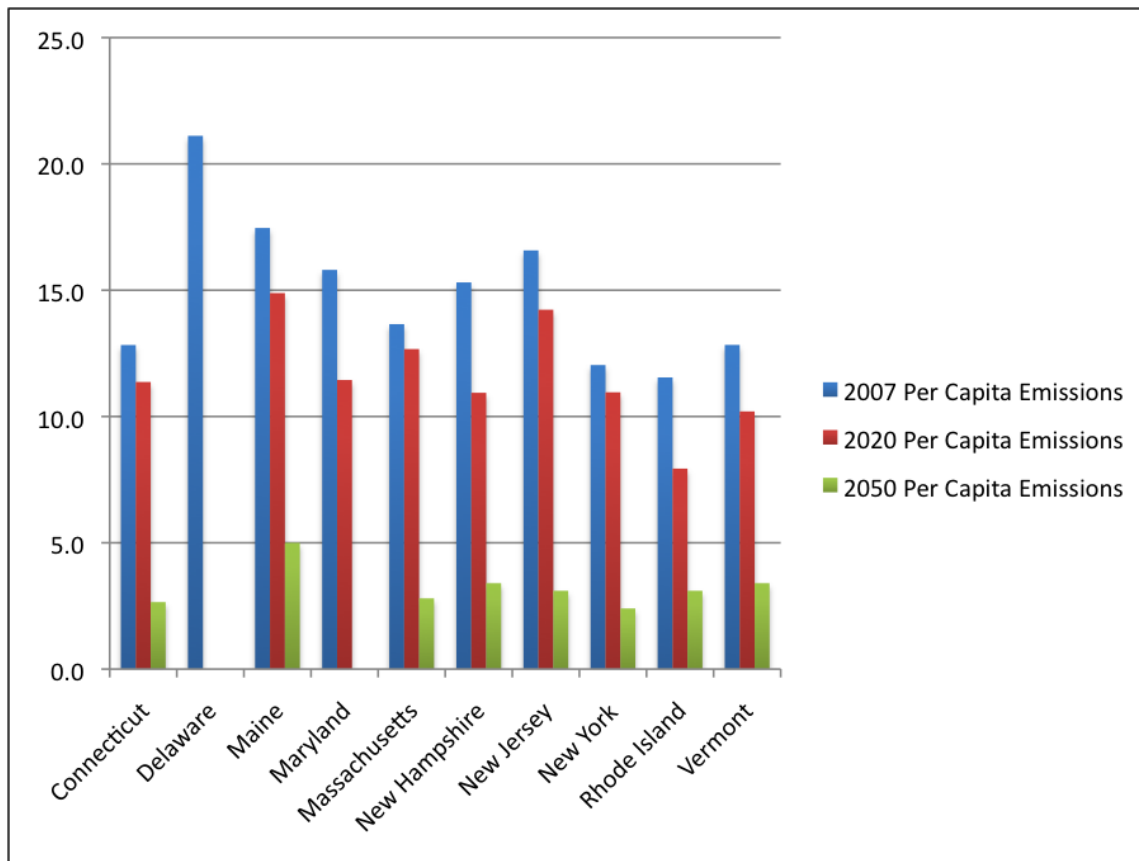


Since the initial signing of the Memorandum Of Understanding of the Regional Greenhouse Gas Initiative (RGGI) in 2005, these 10 New England and Mid-Atlantic states have worked hard to reduce their greenhouse gas emissions. Most of them have set both near and long term state emission reduction goals. This first chart,⁴ which also includes California, shows progress of these states from 1990 through 2010, then projects emission reduction goals for 2020 and 2050.

The second chart provides a good comparison of the three milestone years of 2007, 2020 and 2050. For the RGGI States, the average per capita GHG emissions in 2007 were 14.9 tons/year. Moving forward, the average target for the year 2030 is 11.6 tons/year, and for 2050

⁴ This chart and the one on the next page were provided in a private communication by the Center for Climate and Energy Solutions (formerly the Pew Center on Global Climate Change). It's web address is <http://www.c2es.org>.

is 3.2 tons/year, for an average total target reduction of 78%. *Among the RGGI states, Delaware is the only one without targets.*



For reference, the highest per capita emission for the RGGI states in 1990 was Delaware at 21.1 tons/capita. The lowest was Rhode Island at 11.5 tons/capita. Targeting emission reduction in 2050, the highest target is Maine at 5.0 tons/capita and the lowest is New York at 2.4 tons/capita. If Delaware sets a target of the RGGI States average reduction of 78%, our target per capital emission would be 4.6 tons/capita. If we are to lead, shouldn't we strive for the lowest per capita emission targets in the RGGI region?

3. Economics – Jim Black

The race is not won in the turn. The race is won in the drive to the line after the turn. It is only then that you can raise your arms in victory. But before this, it is the careful intense preparation that you referred to in your State of the State Address. Only with all the pieces in place do you have any hope of attaining the goal.

What is our goal? As you stated, it will not be found in the polarized partisanship of today. My goal, your goal, only looking at the world for what it can do for me, will lead to the ruin many of us fear. Only with all working together, for the common good, will we have any hope of moving toward the future that we want to be our legacy.

I have a friend who works at the PBF refinery and he is fond of this question: "What business did the oil business put out of business?" Whaling. It was not that they ran out of whales, which they almost did, it was that the lubricants and fuels we needed could be more economically refined from oil

than from whale blubber. In a very real sense it was the oil industry we have to thank for any whales remaining.

The reason that I'm telling this story is not because of the whales; it is to express the need - while fossil fuels remain relatively cheap - to find the next industry that will replace oil just as oil replaced whaling.

We are making great strides in this direction and we are suffering setbacks, but we must persevere. As Delmarva showed in their Integrated Resource Plan, savings elsewhere in the economy more than make up the marginal price differential. Cleaner generating technologies with aggressive energy efficiency measures will keep cost increases nominal. However, in other sectors of the economy, the savings will be significant. Health care costs are reduced and worker productivity is increased because of fewer days lost to illness.

The same can be said of mitigation measures for dealing with climate change and sea level rise. Investing in better storm water management and flood control measures will yield immense savings, even if our projections of sea level rise prove to be wrong, in that we will be better protected from the inevitable Atlantic storms that we will experience.

We stand ready to work with your office to set our goal, to find the best line in the turn and then drive all the way to the line to win the prize we all desire, a legacy we can be proud of.

4. Health Impacts of Climate Change – Economic Externalities– Sarah Bucic

Thank you Governor Markell for meeting with us today.

Why do a few degrees of warming even matter? Climate change means there will be changes in rainfall patterns, a rise in sea level, increases in both the frequency and duration of extreme weather events, (heavy rains, droughts, floods), environmental refugees and changes in air and water quality.⁵

Extreme weather events reflect the massive and ongoing change in our climate to which all biologic systems are reacting.⁶ There will be changes in the climate and in weather patterns in **every region of the United States** in the coming decades as a result of increasing atmospheric concentrations of greenhouse gases. The health impacts of a changing climate include asthma and other respiratory illnesses, infectious diseases, heat stress, and preventative heart disease.⁷

Health care professionals now recognize that there is a direct connection between climate change and human health.⁸ Human life and health are at stake if we don't begin the process of adopting a comprehensive climate change plan for Delaware.

⁵ Afzal, B. (2007). **Global warming: A public health concern.** *OJIN: The Online Journal of Issues in Nursing*, 12(2), Manuscript 5.
www.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/Volume122007/No2May07/GlobalWarming.aspx

⁶ Epstein, P.R. (2005). **Climate change and human health.** *New England Journal of Medicine*, 353(14), 1433-1436. At: <http://www.nejm.org/doi/full/10.1056/NEJMp058079>

⁷ Epstein, P. & Rogers, C. (2004). **Inside the greenhouse: The impacts of CO₂ and climate change on public health in the inner city.** Report from the Center for Health and the Global Environment, Harvard Medical School. <http://www.chge.med.harvard.edu/publications/documentsgreen.pdf>

⁸ Patts, G. & Backus, A. (n.d.). **Climate change and health: A resource guide. Resources for health care providers to take action now.** Environmental and Occupational Medicine and Epidemiology Program, Harvard School of Public Health.
<http://www.ehnursing.org/pmwiki.phpn=Main.ClimateChangeAndHealthAResourceGuide>

Some will be more at risk of experiencing the health impacts of climate change than others: the elderly, very young, disabled, poor, those living alone, and those with existing medical conditions.⁹

Climate change may increase the risk of some infectious diseases, particularly diseases that appear in warm areas spread by mosquitoes and other insects, such as malaria, dengue fever, yellow fever, and encephalitis.¹⁰ Some effects of climate change can be helped with having good public health programs, but only in the short term. For true long-term effects, we must reduce known contributions to climate change, especially the burning of fossil fuels.

It is important when comparing costs of energy sources to do full life-cycle analyses, *including all externalities*. For coal, the externalities include the excess cancer, cardiovascular disease, mental retardation and lost productivity from mercury emissions.¹¹

The economic implications of full life cycle analysis of fossil fuels go far beyond the prices we currently pay for electricity. In this light, we see that the cost of remaining on fossil fuels is too high for Delawareans to pay going forward.

Thank you Governor Markell for everything you have already done for our environment. Your vote on fracking shows that you have a strong commitment to ensuring that the health and environment of future generations are seriously considered when making decisions about energy.

We urge you today, Governor Markell, to adopt a comprehensive energy and climate change plan for Delaware. Thank you.

5. Energy and Climate Education – Amy Roe

To place our current energy and climate crisis in context, I would to point out that our relationships with our energy systems have dramatically changed over the past few generations since my grandmother was a child, and my family heated their home with coal that she collected off of the railroad tracks. Over the past century, government and industry have worked together to build a networked energy system to supply passive consumers who are not only disengaged from the energy lifecycle and its resultant environmental impacts, but who also do not have an understanding of the risks involved.¹²

To adequately understand the steps that must be taken for sustainability, we need to reverse this trend and reconnect with our energy system. This requires education, so that we can learn what the numbers and symbols on our utility bills actually mean, where our energy comes from, how to reduce

⁹ Environmental Protection Agency. (2011). **Climate change: Health and environmental effects**. <http://www.epa.gov/climatechange/effects/health.html>

¹⁰ Environmental Protection Agency, Office of Air and Radiation. (2010, April). **Climate change and health effects**. EPA 430-F-10-003 www.epa.gov/climatechange

¹¹ Epstein, P.R., Buonocore, J.J., Eckerle, K., Hendryx, M., Stout, B.M., Heinberg, R. et al. (2011). **Full cost accounting for the life cycle of coal**. *Annals of the New York academy of sciences*, 1219, 73-98. At: <http://onlinelibrary.wiley.com/doi/10.1111/j.1749-6632.2010.05890.x/full>

¹² Nye, David E. 1992. **Electrifying America: Social Meanings of a New Technology**. New Baskerville: The MIT Press; Nye, David E. 2001. **Consuming Power: A Social History of American Energies**. Cambridge: The MIT Press; and Freese, Barbara. 2003. **Coal: A Human History**. New York: Penguin Books.

our consumption and lower our energy costs through efficiency and conservation, and what happens to our environment when we make energy choices.¹³

In 2000 the State of Delaware adopted its first *Climate Change Action Plan* which called for “public education and outreach” to cultivate the knowledge base required for sustained and effective public participation in energy and climate policy in our state.¹⁴ In the past twelve years, we have not yet achieved an acceptable level of knowledge of these issues.

A new plan, with a meaningful education component that addresses the special needs of children and adults, including our decision-makers in government, is desperately needed so that we can engage this issue with a sober understanding to address the energy and climate problems that we are confronting. I ask that the State of Delaware commit to energy and climate education through curriculum standards and public outreach programs in a new climate change action plan. I look forward to contributing my experiences with community-based energy education to this effort.

6. Social and Economic Justice – Rev. Bruce Gillette

My name is Bruce Gillette. My wife Carolyn and I are the co-pastors of Limestone Presbyterian Church; our congregation was the first one in Delaware to put solar panels on our sanctuary roof—180 of them. I am also the Vice-President of Delaware Interfaith Power & Light.

I am honored to be invited to share a word on behalf of the faith communities in Delaware. I am grateful for Governor Markell’s fine leadership that is benefiting our state in many areas.

I got an email yesterday saying that our DNREC Secretary O’Mara would probably not be here for a very good reason; late Saturday his wife gave birth to a beautiful daughter, Riley Elizabeth. Riley is not only a good reason for her father to miss a meeting; she also may be the very best reason for us to have this meeting for a Comprehensive Energy and Climate Change Plan for Delaware. We want that little newborn to grow up in a wonderful state, nation and world; working for the very best plan will help it to be so.

June 4th, 2011 was a very happy day for Governor Markell and me. A few blocks from here, his daughter Molly, and my daughter Sarah, graduated from the Charter School of Wilmington. We want our children, and all children, to have many more days of joy, and not only them, but also their children and the generations to come. I like the Native American Proverb, “We do not inherit the earth from our ancestors, we borrow it from our children.”

I also like a teaching from the Hebrew scriptures that is on a large banner on the side of our church building: “The Earth is the Lord’s” (Psalm 24). In the end, this is God’s world that we are all called to care for (Genesis 1:26).

My faith tradition calls for us to have the Bible in one hand and a newspaper in the other—to seek God’s will in the scriptures and find ways to live it out in today’s world. Today’s *Wall Street Journal* has a letter that concludes: “Research shows that more than 97% of scientists actively

¹³ Tertzakian, Peter. 2009. **The End of Energy Obesity: Breaking Today's Energy Addiction for a Prosperous and Secure Tomorrow**. Hoboken: John Wiley and Sons.; Amann, Jennifer Thorne, Alex Wilson, and Katie Ackerly. 2007. **Consumer Guide to Home Energy Savings**. Gabriola Island, British Columbia: New Society Publishers; Miller, Peter. 2009. **Saving Energy: It Starts at Home**. *National Geographic*, March: 60-81.

¹⁴ Center for Energy and Environmental Policy. 2000. **Delaware Climate Change Action Plan**. Prepared for the by Delaware Climate Change Consortium. Sponsored by the Delaware State Energy Office and State and Local Climate Change Program of the U.S. Environmental Protection Agency. At: <http://www.ceep.udel.edu/publications/globalenvironments/reports/deccap/fullreport.pdf>

publishing in the field agree that climate change is real and human caused. It would be an act of recklessness for any political leader to disregard the weight of evidence and ignore the enormous risks that climate change clearly poses. In addition, there is very clear evidence that investing in the transition to a low-carbon economy will not only allow the world to avoid the worst risks of climate change, but could also drive decades of economic growth.”¹⁵

I am grateful that Delaware’s governor is not a reckless political leader, but a leader of intelligence, compassion and faith. God bless you, your family and your service.

Grace and Peace,
Bruce

¹⁵ **Check With Climate Scientists for Views on Climate**, *The Wall Street Journal*, February 1, 2012.
At: <http://online.wsj.com/article/SB10001424052970204740904577193270727472662.html>

APPENDIX I. LWVDE ENERGY/GREENHOUSE GAS BACKGROUND INFORMATION

INTRODUCTION

This article was prepared by the Energy/Greenhouse Gas Subcommittee to provide background information for League members to read prior to consensus meetings in New Castle County on March 7 and in Sussex and Kent Counties on March 9. Members of the subcommittee are: John Austin, Chris Bason, Sumner Crosby, Mary Anne Edwards, Steve Hegedus, Peggy Schultz and Chad Tolman. More detailed supplementary information for each of the eight sections below, including figures, tables and references, are posted on the League Studies page at the LWVDE web site (<http://lwvdelaware.org/>).

1. LWVUS and LWVDE Key Statements on GHGs and Climate Change

The LWVUS called for prompt and aggressive action to cut U.S. greenhouse gas (GHG) emissions and cited detailed objectives to guide the development of comprehensive climate legislation. In a letter to the U.S. House of Representatives in January 2009, Mary G. Wilson LWVUS President, wrote:

“The League of Women Voters strongly urges you to take quick and strong action against global climate change. Based on the best available science, we urge you to support a cap on greenhouse gas emissions for the year 2020 that is at least 20 percent below 1990 levels, without loopholes that will undermine the cap. We also ask that you support a cap for the year 2050 that is 80-100 percent below 1990 emissions.”

Delaware’s League of Women Voters exercised strong leadership on this subject. In a Letter to the Editor, December 11, 2009, published in both the Cape Gazette and Vol. 16, No. 4 of the LWWNCCo Voter, Delaware League President Sandy Spence wrote:

“The League of Women Voters of Delaware believes that global climate change is one of the most serious threats to the environment, health, economy and security of our nation and the world. League members throughout the country call on the United States and world political leaders to cap emissions at 25% below 1990 levels by 2020. We also join many other civic and social organizations in urging providing critical adaptation and associated assistance to countries most in need. Delaware itself is especially vulnerable to sea level rise, as it has the lowest average elevation of any state in the country....”

2. The Basic Science of Climate Change and the Role of Greenhouse Gases, Especially CO₂

Although Earth’s climate has changed a lot over its long history, ranging from very hot to ice cold, it has been remarkably stable for the past 10,000 years. That began to change with the coming of the Industrial Revolution, when the population began to grow more rapidly and started burning fossil fuels - coal, oil, and natural gas - to power modern industrial societies.

The global average temperature had been relatively stable because the energy absorbed from the sun (mostly as visible light), was balanced by the energy radiated out into space (as infrared). Human activities are causing the emission of several greenhouse gases – especially carbon dioxide (CO₂), but also methane, nitrous oxide and fluorochemicals – that accumulate in the atmosphere and reduce the outgoing radiation. The resulting build up of heat in the atmosphere, land and ocean is causing the

global average temperature to rise - about 0.8°C (1.5°F) so far - mostly during the past 30 years. Projections for 2100 are for increases as high as 6°C (10.8°F), depending on how rapidly humans cut emissions. Sea level rise (SLR) in Delaware is caused by sinking land, expansion of ocean water as it warms, and the addition of water from ice on land. SLR was about a foot (0.3 m) at Lewes during the past century. Projections for 2100 tend to be 0.5 to 1.5 m, but could be much higher.

3. Delaware's per Capita Energy Consumption and GHG Emissions

Delaware's per capita energy use is in the middle in a rank ordering of the states, but higher than our neighboring states of Pennsylvania, New Jersey and Maryland, and about 50% higher than the energy efficiency leaders: New York, Rhode Island, Hawaii, Massachusetts and California. In terms of per capita carbon dioxide emissions, Delaware is in the top 12 of the high emitters – about 35% higher than the 2008 U.S. average of 20.9 metric tons of CO₂ per person per year. Wyoming has the highest per capita CO₂ emissions, but burns a lot of coal to produce electricity used in other states; Vermont has the lowest because a lot of its electricity is produced by hydropower (from Quebec).

For Delaware to significantly reduce its energy consumption and greenhouse gas emissions it will need to greatly improve energy efficiency and replace the burning of fossil fuels – especially coal – by renewable energy sources – especially offshore wind and solar power. In 2006, nearly 70% of the electricity generated in Delaware was from burning coal. That share should decrease by retrofitting Calpine's Edge Moor power plant to burn natural gas instead of coal and by retiring the three older coal units at NRG's Indian River Generating Facility. The proposed Bluewater Wind offshore wind farm should begin generating pollution-free power in 2014. Installed solar PV is rapidly growing. Major reductions in emissions can also come from more energy efficient buildings and transportation.

4. Impacts of Climate Change on Delaware

Delaware's temperatures have been steadily rising since 1895, with this past decade the hottest decade on record. And higher temperatures lead to longer growing seasons. That could be good for Delaware, especially since our number one industry is agriculture. However, insects and diseases will also have longer growing seasons, and coupled with more droughts and intense storms, increased temperatures and weeds migrating from the south, agriculture is likely to suffer, if it cannot adapt.

With storm surges on top of sea level rise, many coastal communities don't stand much of a chance. During the Mothers Day storm of 2008, Kitts Hummock residents climbed from their porches into rescue boats; the Bay had breached the impoundments and surrounded their homes. If New Castle's four dikes were to be breached, 25% of the city would be under water.

Sea level rise brings with it salt water intrusion. At a recent meeting in Dover a farmer told listeners how hard it was to look over a seventy-acre piece of his farm; in some places the ground was white with salt. He said it wasn't storms but tidewater that had come in. Given that 70-90% of the state's commercial fish and shellfish use estuaries as nurseries, increased salt in our rivers and bays could put a lot of fishermen out of work.

5. Steps Delaware has Taken to Reduce GHG Emissions and Adapt to Climate Change

Several programs to reduce emissions and promote energy efficiency and clean energy have been put in place. Legislation passed in 2008 authorized Delaware's participation in the Regional Greenhouse Gas Initiative (RGGI), the nation's first market-based, cap-and-trade program to reduce greenhouse gas (GHG) emissions from power plants. Proceeds from Delaware's sale of CO₂ emission allowances

fund emission reduction projects through grants, provide aid to low-income families, and fund the Sustainable Energy Utility (SEU), created to promote energy efficiency and renewable energy.

The General Assembly has also passed a Renewable Portfolio Standard (RPS), requiring that 1% of total electricity sold in 2007 come from renewable energy sources. The percentage increases gradually each year to reach 25% of which 3.5% is solar PV) by 2025.

Efforts are also underway to reduce GHG emissions by replacing coal with natural gas and by developing renewable energy sources. Calpine and Invista are converting from coal-fired boilers to natural gas; NRG's Indian River Power Plant is in the process of retiring its three oldest coal-fired units - reducing CO₂ emissions by 1.7 million tons, based on 2008 emissions. Since Delaware imports about 38% of its power, these closures may reduce Delaware's CO₂ emissions, but not total emissions within the PJM grid until more renewable generation comes on line.

Delmarva Power has agreed to buy 200 MW wind power from NRG's Bluewater Wind project, which will be one of the first offshore wind farm in the United States. It will provide a supply of clean, stably priced energy, as well as providing other economic and health benefits.

6. Based on Past Delaware Energy and Climate Change Studies, What Near- and Long-Term Actions Do We Recommend the League Support?

In the past decade there have been three major Delaware energy/climate change plans: **The Delaware Climate Change Action Plan** in 2000, **Bright Ideas for Delaware's Energy Future** in 2003, and the **Delaware Energy Plan 2009-2014**. The emphasis of the first was on reducing greenhouse gas emissions, with most of the reductions to come from improvements in energy efficiency. The report said: "A well-conceived public education and outreach program will be critical to efforts to implement the Climate Change Action Plan." The 2003 **Bright Ideas** report also gave top priority to improving energy efficiency and conservation, but encouraged renewable electricity – especially distributed (small scale) generation. It also encouraged clean energy technologies to locate their business operations in Delaware.

The **Delaware Energy Plan**, published in 2009 by the Governor's Energy Advisory Council, is the most recent and most comprehensive of the three. Five Work Groups dealt with various aspects of the plan:

- Reducing Delaware's Energy Use
- Reducing the Environmental Footprint of the Energy Delawarean's Use
- Transmission & Distribution
- Reducing Transportation Energy Use
- Clean Energy Businesses

Some of the recommendations we support are:

FP- 1: Establish a greenhouse gas reduction goal ~~and a Climate Change Commission~~ to develop a detailed Climate Action Plan for Delaware.

EO- 1: Develop and implement a comprehensive Energy Education and Outreach Program.

CE- 2: Develop and implement a Comprehensive Energy Workforce Training Strategy.

CE- 3: Fund targeted Wind and Solar industry business development initiatives.

LU- 1: Strengthen Delaware's efforts to effectively direct growth into growth zones and require Smart Growth.

EE- 1: Adopt an Energy Reduction Goal & Vision to achieve energy self- sufficiency and carbon neutrality in Delaware's built environment by 2030.

FP- 7: Reduce the carbon emissions from the State's existing coal and other power facilities.

7. What Other States Have Done

States from around the nation have developed a great variety of programs to reduce the various sources of greenhouse gas emissions in their states. The most comprehensive programs start with the development of a detailed, state-specific assessment of the vulnerabilities to climate change, as well as the state-specific mix of greenhouse gas sources. Programs are then built to address the state-specific opportunities to tackle these challenges. *There are lots of things going on out there: there are 50 states, with 50 unique programs, built around each state's particular vulnerabilities and appetites for action.* Additionally, there are several regional compacts built around regional targets for GHG remissions reductions, such as the RGGI, and of course, there are many cities and counties forging their own paths.

[The Pew Center on Global Climate Change](#) has an excellent summary of state actions, as well as a database and maps of various kinds of programs by state: [summary of state climate actions](#). Additionally, they have compiled an excellent table that shows an array of programs and the states engaged in each: [interactive table of all states' greenhouse gas reduction actions](#).

8. The Potential and Cost of Delaware's Renewable Energy Resources

Once installed, solar and wind systems generate negligible CO₂ emissions. Within 1-2 years, a solar array 'pays back' the energy required for its manufacture, while for offshore wind, it takes less than a year. Thus, for the rest of the 25-year (solar) or the 20-year (wind) lifetime, every kWh generated is emission-free energy. Thus, these are ideal technologies to prevent CO₂ and other harmful emissions.

The new RPS legislation will require Delaware to obtain 25% of its electricity from renewable sources by 2025, with a minimum of 3.5% from solar PV (photovoltaic) within the state. That will require about 350 MW of installed PV capacity. To meet this goal will require only 0.1% of our land area, which is about a quarter of the area covered by golf courses in DE. As of 2010, Delaware has about 10 MW of grid-connected PV capacity installed. But this will double with the completion in 2011 of the 10 MW Dover Solar Park project. Delaware receives plentiful sunlight; the average intensity is about 80% that of California.

When completed, the 200 MW offshore wind project will produce an average of 650,000 MWh annually, or about 5% of our annual electricity needs.

Solar PV does not require any additional transmission lines because it is a distributed energy source. In fact it reduces grid congestion on hot summer days. Wind requires additional transmission lines because it is centralized and produces more power per site.

APPENDIX II. LETTER TO GOVERNOR MARKELL

Governor Jack Markell
Tatnall Building
William Penn Street, 2nd Floor
Dover, DE 19901

June 24, 2011

Dear Governor Markell,

Under your leadership, Delaware can lead the transition to a clean energy economy. The missing keystone is an aggressive greenhouse gas emissions target and a plan to prepare Delaware for the impacts of climate change. Therefore, we are asking you to issue an executive order that creates a strong comprehensive energy and climate plan that lowers Delaware's greenhouse gas emissions and makes Delaware more resilient to the dangers of climate change for generations to come.

The closely related issues of energy and climate change pose the most serious economic, scientific, technological, security and ethical issues of our time. Fossil fuels, on which our modern society is largely based, are finite. Adequate supplies are becoming increasingly expensive and dangerous to produce. Increasing populations and rising expectations – particularly in the developing world – are increasing energy demand and prices. The burning of fossil fuels, which all contain carbon, is increasing concentrations of carbon dioxide in the atmosphere at an ever increasing rate, changing the world's climate, and threatening food and water supplies, human health, lives, and property and the survival of species of plants and animals around the world. Delay in dealing with the problem will only increase the future costs and dangers, as well as reduce the opportunities for economic development that could come to Delaware if it is seen as an environmental leader, and a good location for green businesses.

Delaware is particularly vulnerable to sea level rise because of its long coastline and the fact that it has the lowest average elevation (about 60 feet) of any state in the nation. Sea level rise at Lewes was about a foot during the past century but is likely to be 2-5 feet or more during the coming one – depending on how rapidly the U.S. and other major emitters reduce their greenhouse gas emissions and how rapidly Greenland and Antarctica lose their ice as the Earth warms.

We have far-sighted leaders, a supportive legislature, and centers of excellence in energy policy and renewable energy development at the University of Delaware and at a number of companies. We believe that the health of our economy and even our future viability as a state depend on how well we manage the transition to the new green sustainable energy society. We would like to see Delaware become a leader in that effort. Though we are small, we are nimble, and can demonstrate that it is possible to build our economy, protect our environment, and improve the health and welfare of our people – convincing others to do the same.

The outlines of an energy/climate change plan for the transition came out of a 6-month study by the Energy/GHG Subcommittee of the League of Women Voters of Delaware. Supporting information can be found in a summary on the Studies page of the League's web site at:

<http://lwvdelaware.org>. The plan was refined through a series of consensus meetings in all three counties and adopted by the League Board in March. Since then it has been endorsed by a number of other organizations and individuals, whose names appear at the end of this letter.

The League of Women Voters of Delaware supports an aggressive and comprehensive energy use/climate change plan for Delaware. Some key points that should be included:

- *Accelerate bringing new green businesses, jobs and industries to Delaware, and investigate emerging energy technologies.*
- *Set targets and a timetable for reducing Delaware's total greenhouse gas emissions.*
- *Plan for extensive adaptation measures at all levels of government for climate change impacts that cannot be avoided---especially sea level rise.*
- *Support public education and outreach; expand renewable energy and climate change in Delaware curriculum standards.*
- *As Delaware calculates energy costs, full life cycle analyses* with all externalities** must be included.*
- *Social and economic justice must be considered in implementing energy and climate change policy.*

**Life cycle analysis is a technique to assess environmental impacts associated with all the stages of a product's life from cradle-to-grave (i.e., from raw material extraction through materials processing, manufacture, distribution, use repair and maintenance, and disposal or recycling).*

***Energy externalities are external costs and benefits--health, environmental, security, and infrastructure--associated with the production, distribution, and consumption of energy that are not, or may not be fully incorporated into the market price.*

Thank you for your leadership and your thoughtful consideration of this request.

Sincerely,

Carol D. Jones, President
League of Women Voters of Delaware

Dr. Chad Tolman Chair,
Energy/Greenhouse Gas Subcommittee
League of Women Voters of Delaware

ORGANIZATIONS AND INDIVIDUALS SUPPORTING THE E/CC PLAN

Organization	Contact/Position
League of Women Voters of Delaware	Carol Jones, Current President Sandra Spence, Past President
Delaware Chapter Sierra Club	Nancy Moore, Chair
Delaware Nature Society	Brenna Goggin, Environmental Advocate
Delaware Center for Horticulture	Pam Sapko, Executive Director
Delaware Audubon Society	Mark Martell, President
Citizens for Clean Power	Bill and Kit Zak, Co-Chairs
Clean Air Council	Thurman Brendlinger, Program Director
Delaware Chapter of the North East Energy Association	John Mateyko, Chapter Chair
Delaware City Environmental Coalition	Sarah Bucic, Chair
Appoquinimink River Association	Jeffrey Vance, President
Newark Natural Foods Community Co-Op	Shannon Cannor Winward, Board Secretary
Students for the Environment, UD	Lindsay McNamara, President 2010-2011
Nurses Healing Our Planet - of the Delaware Nurses Association	Sandra Reddy BSN, RN Chair
Partnership for Sustainability in Delaware	Jim Black, Chairman
South Coastal Delaware AARP Chapter #5226 Executive Board	Joan Thomas, Chapter President
Delaware Pacem in Terris	Sally Milbury-Steen, Executive Director
Sustainable Economic Development Strategies, LLC	Dr. Marc Weiss, Chairman, and Nancy Sedmak-Weiss, Vice President and General Counsel
Delawind, LLC	Hazzan Freyda Black, President
Delaware Greenways	Mark Chura, Executive Director
Coalition for Climate Change Study and Action	Chad Tolman, Chair
Social Justice Committee, Unitarian Universalists of Southern Delaware	John Sykes, Member
Rev. Jonathan Baker	Pastor, Epworth UMC, Rehoboth
Rev. Bruce Gillette	Pastor, Limestone Presbyterian Church
Rev. Josh Snyder	Minister, First Unitarian Church

Cc: Collin O'Mara
Carolyn Snyder
Phil Cherry

APPENDIX III. ORGANIZATIONS AND INDIVIDUALS ATTENDING THE MEETING WITH GOVERNOR MARKELL ON FEB. 1, 2012

Organization	Individual/Position
Clean Air Council	Thurman Brendlinger, Program Director
Coalition for Climate Change Study and Action	Chad Tolman, Chair
Delaware Audubon Society	Mark Martell,* President
Delaware Center for Horticulture	Pam Sapko, Executive Director
Delaware Chapter of the North East Energy Association	John Mateyko, Chapter Chair
Delaware Chapter Sierra Club	Nancy Moore, Chapter Chair Amy Roe, Executive Committee
Delaware City Environmental Coalition	Sarah Bucic, Chair;
Delaware Interfaith Power and Light	John Sykes, President Louise White Sykes, Member of Board
Delaware Nature Society	Brenna Goggin, Environmental Advocate
Delaware Pacem in Terris	Sally Milbury-Steen, Executive Director
Epworth United Methodist Church, Rehoboth	Ken Mahan, Facilities Manager; Jackie Shockley and Bob Thompson, Social Justice Co-Chairs
First Unitarian Church, Wilmington	Rev. Josh Snyder,* Sr. Minister; Donna Gonzalez, Co-Chair, Green Sanctuary Team
Flaherty Consulting	John Flaherty, Lobbyist
League of Women Voters of Delaware	Carol Jones, President Pat Todd, Energy and Natural Res. Chair
Limestone Presbyterian Church, Wilmington	Rev. Bruce Gillette, Co-Pastor
Nurses Healing Our Planet, Delaware Nurses Association	Sandra Reddy BSN, RN, past Chair Ann Darwicki, RN, current Chair
Partnership for Sustainability in Delaware	Jim Black, Chairman
Students for the Environment (S4E), UD	Lindsay McNamara, past S4E President and Intern, Delaware Environmental Institute/Center for Science, Ethics and Public Policy Tyler Yoder, student
Sustainable Economic Development Strategies, LLC	Dr. Marc Weiss, Chairman; Nancy Sedmak-Weiss, Vice President and General Counsel

* These individuals were unable to attend at the last minute on Feb. 1 because of urgent business or illness.

APPENDIX IV. GREENHOUSE GAS EMISSION TARGETS OF OTHER STATES*

ENTITY	TARGET	NOTES & SOURCE
Arizona	2000 levels by 2020 50% below 2000 levels by 2040	Executive Order 2006-13, 2006
California	2000 levels by 2010 1990 levels by 2020 80% below 1990 by 2050	Executive Order S-3-05, 2005. Assembly Bill 32 caps levels at 1990 levels by 2020; includes enforceable penalties, 2006
Colorado	20% below 2005 levels by 2020 80% below 2005 levels by 2050	Executive Order D-004-08, 2008
Connecticut	10% below 1990 levels by 2020 80% below 2001 levels by 2050	House Bill 5600, 2008
Florida	2000 levels by 2017 1990 levels by 2025 80% below 1990 levels by 2050	Executive Order 07-127, 2007
Hawaii	1990 levels by 2020	Act 234, Global Warming Solutions Act of 2007
Illinois	1990 levels by 2020 60% below 1990 levels by 2050	Gubernatorial announcement, 2007
Maine	1990 levels by 2010 10% below 1990 levels by 2020 75-80% below 2003, long term	Act to Provide Leadership in Addressing the Threat of Climate Change, 2003
Maryland	25% below 2006 levels by 2020; all sources except manufacturing	GHG Emissions Reduction Act of 2009; requires task force to submit plan for achieving target; plan to be adopted by 12/12; measures must provide a net economic benefit to the state & net increase in jobs.
Massachusetts	80% below 1990 levels by 2050 interim target of 10-25% below 1990 levels by 2020; undetermined targets for 2030 and 2040	Global Warming Solutions Act, 2008; "undetermined" targets to be set by Secretary of Energy & Environmental Affairs
Michigan	20% below 2005 levels by 2025 80% below 2005 levels by 2050	Executive Directive 2009-4
Minnesota	15% below 2005 levels by 2015 30% below 2005 levels by 2025 80% below 2005 levels by 2050	Next Generation Energy Act, 2007

* Compiled into table form from prose text by Peggy Schultz from *Greenhouse Gas Emissions Targets*, Center for Climate and Energy Solutions, Arlington, VA, April 2011.
http://www.c2es.org/what_s_being_done/in_the_states/emissionstargets_map.cfm

Montana	1990 levels by 2020	Recommended by Montana Climate Change Advisory Committee; application letter to the Western Climate Initiative, 2007
New Hampshire	1990 levels by 2010 10% below 1990 levels by 2020 75-85% below 2001 levels long term	Agreement with Climate Change Action Plan of The New England Governors & the Eastern Canadian Premiers, 2001
New Jersey	All sources in state & electricity generated out of state but consumed in state...1990 levels by 2020; 80% below 2006 levels by 2050	Executive Order 54, 2007; confirmed by Global Warming Response Act A3301, 2007
New Mexico	2000 levels by 2012 10% below 2000 levels by 2020 75% below 2000 levels by 2050	Executive Order 2005-033, 2005
New York	5% below 1990 levels by 2010 10% below 1990 levels by 2020; by Executive Order, 80% below 1990 levels by 2050	2002 State Energy Plan & Final Environmental Impact Statement Executive Order No.24 (2009)
Oregon	Stop growth of GHG emissions by 2010 10% below 1990 levels by 2020 75% below 1990 levels by 2050	House Bill 3543
Rhode Island	1990 levels by 2010 10% below 1990 levels by 2020 75-85% below 2001 levels long term	Agreement with Climate Change Action Plan of The New England Governors & the Eastern Canadian Premiers, 2001
Utah	2005 levels by 2020	Announcement by Dept. of Env. Quality, 2008. Policy tools include: increased reliance on renewable energy, policies to reduce energy demand and increase efficiency, mass transit policies and participation in Western Climate Initiative.
Vermont	1990 levels by 2010 10% below 1990 levels by 2020 75-85% below 2001 levels long term	Agreement with Climate Change Action Plan of The New England Governors & the Eastern Canadian Premiers, 2001
Virginia	30% below business-as-usual by 2025	Executive Order 59, creating Governor's Commission on Climate Change, 2007
Washington	1990 levels by 2020 25% below 1990 levels by 2035 50% below 1990 levels by 2050	Executive Order, 2007 SB 6001 set into law provisions of Executive Order, 2007. HB 2815 confirmed targets & directed Dept. of Ecology to create a GHG reduction plan - released in 2008.