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RE: Docket No. EPA-HQ-OAR-2013-0602:

**Testimony in Support of EPA Proposed Carbon Pollution Emission
Guidelines for Existing Stationary Sources: Electric Utility Generating
Units**

July 31, 2014

Pittsburgh, PA

**Researcher and Writer, Institute for Green Sciences
Carnegie Mellon University**

**Senior Scholar, Chatham University
Former Director, Rachel Carson Institute**

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Testimony Presented July 31, 2014
Federal Courthouse
Pittsburgh Pennsylvania
9:35 AM

RE: Docket No. EPA-HQ-OAR-2013-0602: Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units

My name is Patricia M. DeMarco, resident of Pittsburgh, PA. I am a geneticist by training, with a thirty- year career in energy and environmental policy spanning both public sector and private utility sector service. I served as a Commissioner of the Regulatory Commission of Alaska for from 1999 to 2002 and have taught energy and environmental policy and ethics at the University of Pittsburgh for the last six years, while serving as the Director of the Rachel Carson Institute at Chatham University.

Thank you for pursuing this important rulemaking initiative. We are facing the definitive challenge of our time – the need to shift from a fossil fueled economy to a renewable and sustainable economy. I stand to speak for the countless constituents who will not be heard in these proceedings – the unborn generations whose fate will be determined by our actions but who have no voice in the decisions that will shape their future. Our fossil fueled energy system is by far the largest contributor to carbon dioxide emissions that are causing climate changes. The transition from a fossil fueled economy to a renewable energy powered economy is the surest way to abate the effects of climate changing gas emissions, and it will preserve the land from more and more invasive and destructive methods of extraction. While a change from an energy system entrenched for 200 years seems daunting, the consequences of continuing this pattern of energy use are surely devastating both to the atmosphere and to the fresh water system, for us and especially for our children and their grandchildren. We can make better choices that lead us to a stable economy based on renewable and sustainable energy solutions. The choices are not primarily about technology but rather about our values and priorities.

I support this regulatory action to face directly the major cause of carbon dioxide emissions that are contributing to climate change. Existing fossil fueled Electricity Generating Units emit 38.7% of the greenhouse gas emissions contributing to climate change. The approach presented in this rulemaking addresses the need for just and reasonable outcomes for the industry affected as well as for the consumers and the general public interest. The Summary of Net Benefits illustrated in Table 1 and Table 2 show net benefits of \$46 to \$82 Billion dollars, well over the \$5.5 to \$7.3 billion dollar

estimated cost of compliance. These benefits are validated by a later study conducted by the National Academies of Science in 2010 titled, “The Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use.” The section on Coal, pages 104 to 142, indicate that the oldest 10% of coal-fired power plants contribute the most emissions, and cause the majority of the health effects and climate effects. Most of the carbon emissions from Existing Generation Units, addressed in this rulemaking, come from coal fired electric generation plants that are over 50 years old.

RE: Section 2.b State Plans and Goals:

By offering flexibility in developing plans for each state, there is room for regional and state-specific tailoring of the effects. However, it is critical that the federal standards apply uniformly across the nation. Our energy policy since the 1992 initiatives restructuring the energy industry has resulted in a patchwork of regulatory regimens with sometimes conflicting and contradictory paths. In the 23 states where consumer choice in generation is permitted, surges in renewable energy and distributed generation practices have taken place. In states with continued regulatory controls, such progress comes with great effort.

Moving to a market based system of energy policy may have had grounds in theory, but in a market so distorted and layered with subsidies, incentives and unevenly applied penalties, there is no clarity in the market signal. The benefits of controlling climate change do not appear in the fuel price. The costs of production and use do not appear in the fuel price. Annual subsidies of over seven billion dollars to the coal, oil, and fossil gas industries are hard wired into the budget process by laws accumulated over decades. The \$400 million average annual incentives to renewable energy systems must be reinstated in each budget cycle. The explicit monetizing of benefits of controlling climate change illustrated in this regulation may be a start to correcting these market failures.

Pennsylvania is one of the major producers of carbon emissions because of the age and technology of many of the electricity generating plants operating in the state. Of 406 coal-fired power plants studied in the National Academy of Sciences evaluation of the uncounted costs of energy, 19 of the worst emitters of pollution came from coal plants in Pennsylvania. The age and ancient technology employed in these plants contributes to this sorry profile.

By adopting firm metrics to measure reductions, there is certainty of the outcome. It is time to seize boldly the opportunity to transition away from fossil fuel combustion as the principal form of electricity generation in the 21st century. **Guidance to the states in developing climate control plans should include a recommendation that the oldest and least efficient coal fired power plants should be retired, dismantled and removed from service.** The steam turbine, invented in 1866, fueled by burning fossil coal, converts only 33 % of the fuel value to electricity; the rest is lost as waste heat. If there is a scrubber added to control fine particulates, the net output is less, and if there is further treatment to capture mercury, cadmium and lead the output falls even more. In the projected eventuality of carbon capture and sequestration – that means putting the smoke from the combustion away – the net output of electricity for sale can be as little as

11% of the fuel value. Which means even more coal would have to be burned to produce the same amount of useful power! It is a diminishing return.

In addition to the inefficiency of conversion from fuel to electricity, there is a tremendous burden on the water supply. **According to the U.S. Geologic Service, thermoelectric cooling of power plants uses 50% of available surface and groundwater.** (U.S. Study of Water Sources and Uses in the United States, 2005. www.usgs.gov. Thermoelectric cooling = 201,000 mgd of 410,600 mgd total available water.) Water availability and distribution, especially for surface water, is expected to be affected by climate change. Many areas of the country already experience droughts and major shifts in precipitation patterns attributed to climate change. Priority uses for food production, sanitation, industry and domestic use will compete with this large demand in the electricity generation sector. The steam driven cycle used to produce fossil fueled power is not a viable approach to our future energy needs. If we continue using fossil fuels for energy in this inefficient and destructive manner, we will follow the fate of the dinosaurs whose bones we are burning.

RE: Section E Determination of the Best System of Emission Reduction

The illusion of cheap and plentiful coal supplies acts as a deterrent to developing more effective and less damaging ways of providing the necessary work of producing electricity. Of the 38 Quadrillion Btu of energy used in generating electricity in 2013, only 12.4 Quadrillion Btu went to customers to perform energy services; all the rest was wasted. (Lawrence Livermore National Laboratory. Energy Flows for 2013) This amount of energy could be generated by solar photovoltaic power from 2.2 million acres of land, which is less than one tenth of one percent of the total area of the country. (www.landartgenerator.org) If the existing developed land, estimated at 108.1 Million acres, including interstate highway medians, rooftops and other flat areas, were offered as surface for such installations, more than ten times the necessary amount of surface is already available, with the power source already distributed to the load. (EPA Report on the Environment. 2008. Exhibit 4-5. <http://cfpub.epa.gov/eroe/index>)

Establishing an energy system with a focus on meeting the work of energy services, rather than on replacing fuels, yields many exciting and innovative possibilities. The Presidents Executive Order requiring all federal installations to achieve zero net energy/zero net water/zero net waste profiles by 2030 has created a model forward for the nation. (Executive Order 13514. Federal Leadership in Environmental, Energy and Economic Performance. October 5, 2009.) If this kind of cost-effective sustainable development is applied nationwide, the electricity generation requirements will be met without the carbon emissions and without the waste and environmental devastation inherent in mining thin seam coal from mountain top removal, or generating power from nuclear sources with the continuing challenges of subsidized insurance, intense thermoelectric cooling requirements and long term high level radioactive waste issues.

The requirement for a state plan for compliance is an important opportunity for involving citizens, industries and local government in a wider dialogue about our energy future. Recent polling shows that 62% of Americans, across all persuasions of

the political spectrum, believe climate change is a serious issue and support government action to control carbon emissions. (Yale and George Mason Poll March 2014) Even in Pennsylvania, 72% of registered voters favor the EPA rules limiting carbon emissions. (Hart Research Associates. June 2014. Poll of Pennsylvania Attitudes about EPA Carbon Regulations and Climate Change.) However, people do not know what they can do themselves, and are confused about the effectiveness of individual actions. It is the responsibility of government, acting in the public interest, to offer guidance and direction. Among a menu of choices, all are not equally effective. I reject the premise of an energy policy that supports “all of the above” as a strategy. There are some courses of action that should be retired for the sake of preserving climate stability, and for the sake of the health of our citizens and for generations to come. The choice we make for our children and grandchildren is not based on technology. We have the technical capacity to do more and more elaborate and exotic manipulations of the natural world. The choice is one of the ethical responsibility we have to those who will follow us. Our choices today will constrain the options available to our progeny because the forces of natural law acting on the flow of carbon between atmosphere and ocean spans hundreds of years, not hours. The carbon dioxide already in the atmosphere, will take hundreds of years to resolve. The daily destruction of forest and vegetation adds to the pace of atmospheric carbon dioxide concentration.

Providing effective public information about the gravity of the climate change situation is a serious responsibility of the EPA, the Department of Energy and the federal and state governments across the country. The United States has the highest per capita Carbon Dioxide emissions in the world (British Petroleum Global Statistical Report for 2012), and falls thirteenth out of sixteen industrialized countries in efficiency and conservation practices. (2014 International Energy Efficiency Scorecard. American Council for an Energy-Efficient Economy. www.aceee.org) In the period from 1978 to 1982 under the Energy Conservation and Production Act of the National Energy Acts of 1978, the direct tax deduction for residential and small commercial energy efficiency and conservation improvements caused a surge in local investment in conservation, efficiency improvements and renewable energy installations. This was accompanied by a directed and constant outreach effort ranging from “Tips to Energy Savers” in Spanish and English distributed to all sixth graders and available everywhere, including banks, to active community weatherization efforts coordinated through state energy offices. Today, the public hears widely divergent and often biased information on the mainstream media. The kind of information on government web sites is NOT mainstream. The Climate Action Plan, the 2014 National Climate Assessment and the background information for this rulemaking should be offered to the public in infomercials and on billboards. We have serious choices to make. We can unleash the innovation and creativity of the American people for adopting energy efficiency, energy productivity improvements and renewable energy applications through appropriately focused information and incentives. We can at least match the accomplishments of Germany and other countries where renewable resources are used first before fossil and nuclear resources feed into the electric generation mix. Instead of curtailing and limiting the use of renewable resources, we should be finding ways to enhance and expedite their adoption in broad applications. The State Plans for compliance with this proposed

regulation can be effective, but enhanced public information will be an important component of success.

If the many advocates for the coal industry that you will hear from today wish to be in the energy industry in 50 years, they will turn their talents and attention to the needs of the future, not cling stubbornly to a technology whose time has passed. It is time to revisit the laws that govern regulated utilities. Utilities experience conservation, efficiency improvements and renewable distributed generation by customers as revenue loss. There needs to be a reform of the utility tariff structure to allow utilities to invest in distributed renewable resources on customer properties, financed through the tariffs, and recovered as investments in the rate base. Moving the concept of a utility generation system away from central station, fossil-fueled antiquities into distributed resources connected in micro-grids offers the utility system a more robust, reliable and resilient service model. Whole categories of utility service, such as load balancing, backup and storage facilities, and smart metering await integration into a new way of providing electric service. As the electric vehicle begins to penetrate the market, the need for such advanced utility services will expand.

Technology in compressed air storage, shaft torque, battery and phase change chemistry remain in the archives of the Defense Advanced Research Projects Administration, paid for by tax dollars and classified as national security priorities. We can apply the same approach that achieved space station construction and interplanetary exploration devices to the logistical problem of energy storage and distribution. There are whole categories of new utility services available for development in support of renewable and sustainable distributed energy systems. Surely in the 21st century we can secure our energy needs in ways that are more efficient, less damaging to health and environment, and more productive of jobs and protective of resources than the draconian application of a Victorian age technology through brute combustion!

The gaping scars of strip-mined land, un-remediated and barren with rusty, sterile streams running as the tears of the weeping earth are the legacy of coal in Pennsylvania. Over 3,000 miles of streams devastated by acid mine drainage wend through the hills and fields of this state. It is time to call a halt to this practice, to embrace a future that preserves and finds harmony with nature - the fresh air, clean water, fertile ground and biodiversity of species that are our life support system, our gifts from the living earth. It is time to build the infrastructure to support widespread use of renewable resources. A federal mandate that provides for using renewable resources as the first choice before loading in service from fossil fueled electric generating units would create a positive incentive for ramping down the coal in an orderly manner, taking the oldest, most polluting units off line permanently as non-combustion renewable capacity expands.

The regulation presented here to control emissions from existing Electric Generation Units is a very modest start. This is no time for timid responses. We must take bold and decisive action to preserve the stability of our fragile climate. Our actions will determine the fate of our children and their grandchildren.