Blue Ridge Environmental Defense League

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December 1, 2014

Gina McCarthy
Administrator
EPA Docket Center
Mail code 28221T
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Re: Docket ID No. EPA-HQ-OAR-2013-0602

Dear Ms. McCarthy:

On behalf of the Blue Ridge Environmental Defense League and its members and chapters in Virginia, North Carolina, South Carolina, Tennessee, Georgia, Alabama and Mississippi, I write to comment on the proposed Clean Power Plan (ñPlanò) proposed rule under consideration by the US Environmental Protection Agency, Docket No. EPA-HQ-OAR-2013-0602.

Overview and Recommendation

The intent of the Clean Power Plan is enforceable goals for carbon emission reductions and a flexible framework for implementation. The EPAôs goals are to maintain affordable, reliable energy, cut pollution, and protect public health and the environment; these are goals shared by the Blue Ridge Environmental Defense League. However, there are parts of the EPA Plan which we believe will not adhere to these estimable goals. In our comments we will present in detail our reasoning; but in brief, the EPAôs reliance on nuclear power, biomass and natural gas are misplaced. Therefore, we recommend that the EPA abandon its optimistic assumptions regarding these three methods of generating electricity. This alteration would put the Plan on a more secure foundation and avoid expensive and counterproductive blind alleys; moreover, it would lend genuine meaning to the term *Clean Power*. We urge that all necessary and prudent steps be taken by the electric power industry, the EPA and the states to reduce carbon emissions as quickly as possible.

Background

On June 18, 2014, the EPA published the Clean Power Plan to cut carbon pollution from electric generating power plants. Its purpose is to create enforceable goals for states to reduce emissions and a flexible frameworkð Best System of Emissions Reduction, or BSERð to implement carbon reductions. The Plan would set carbon dioxide (CO_2) emission rate goals to be achieved by 2030. According to EPA, if the 2030 emission rate goals are achieved, CO_2 emissions from electric power would be reduced by 30%

nationwide.[1] The EPA allows for the fact that states have different electric power resources and expects them to cooperate with the federal government in cutting greenhouse gas pollution. The Plan is based on the assumption that approximate reductions will come from four ñbuilding blocksò in the following manner:

6%	Coal-fired power plant efficiency improvements
13%	Natural gas combined cycle displacement of coal
9%	Renewable energy sources like wind and solar, and continued use of existing nuclear power generation
13%	Energy efficiency

Under the Clean Power Plan, Renewable Energy generation includes solar, wind, geothermal, wood and wood-derived fuels and other biomass. The Plan excludes hydroelectric power. The EPA basis for determining each stateôs goal is to total CO_2 emissions from fossil fueled power plants in pounds divided by the stateôs electric power generation from power plants using both fossil and non-fossil sources in megawatt hours (MWh). Table A lists the data for the EPAôs specific statewide carbon goals within the Blue Ridge Environmental Defense League service area.

Table A. Clean Power Planï Proposed State Goals[2]

State	2012 Emissions (million metric tons)	2012 Energy Output (TWh)*	2012 Fossil Rate (lbs/MWh)	2012 Fossil, Renewable and Nuclear Rate (lbs/MWh)	2030 State Goal (lbs/MWh)
Alabama	68.56	104.64	1,518	1,444	1,059
Georgia	57.02	83.80	1,598	1,500	834
Mississippi	23.50	45.86	1,140	1,130	692
North Carolina	53.13	71.17	1,772	1,646	992
South Carolina	32.57	45.23	1,791	1,587	772
Tennessee	37.41	43.33	2,015	1,903	1,163
Virginia	24.83	42.20	1,438	1,297	810

*includes existing non-hydro renewable energy generation and approximately 6% of nuclear generation. The 2012 emission rate shown here has not been adjusted for any incremental end-use energy efficiency.

The formula used to develop the above goals is:

CO_2 emissions in lbs/MWh = Net CO2 emissions regulated EGUs-6% heat efficiency ÷ Total net megawatt-hours of EGUs + renewables + nuclear + avoided generation

[1] Emission rate reductions use 2012 as the baseline year. Interim goals are also established for the 2020ï2029 timeframe. EPAôs emission rates are measured in pounds of CO_2 emissions per megawatts-hours (MWh) of electricity generation.

[2] Source: US EPA Spreadsheet, Brian Fisher, 6/23/14, accessed at http://www2.epa.gov/carbon-pollution-standards/where-you-live

According to the Congressional Research Service report, [3] ñThe emission rates are a function of EPAôs specific emission rate methodology. States may choose to meet emission rate goals by focusing on one or more of the building block strategies or through alternative approaches.ò

Under the EPA Plan, each state chooses how to attain the standard based on its circumstances and policies. They are not limited to the EPAôs proposed building blocks so long as they meet the goal.

General Comments

Global warming is a planetary crisis which demands concerted, substantial and meaningful action. The scientific basis connecting human activity with the rise in global temperature continues to mount. The rising levels of greenhouse gases in the atmosphere have been tied to expanding human civilization during the last 250 years.

Regarding the Plan, Blue Ridge Environmental Defense League supports the following criteria for EPA-mediated carbon dioxide reductions:

1. To reduce overall emissions by 25-30 percent by 2030[4] and make further reductions thereafter.
2. To require that emission reductions in state plans be measurable, verifiable and enforceable.
3. To require that statesô plans include enforceable requirements for each individual covered emission source.
4. To include all fossil fuel sources that generate electricity for the grid and are currently required to report their emissions.
5. To recognize all measures that quantifiably reduce emissions from the covered sources, including energy efficiency and renewable energy.
6. To ensure that performance standards in EPAôs guidelines accurately reflect the full set of measures that can be used to comply.
7. To provide for approval of alternative state plans only if they result in total carbon dioxide reductions from the power sector as great or greater than those proposed in the guidelines.
8. To allow states to adopt plans that are more stringent than the EPA guidelines.
9. To have EPA propose a standby Plan by June 2015 and promulgate it by June 2016 for states that may not submit acceptable state plans by that deadline.
10. To review and update the Plan at least every eight years.
11. To ensure that the most vulnerable communities are protected by standards and are consulted throughout the standard-setting process.

[3] *State CO2 Emission Rate Goals in EPA's Proposed Rule for Existing Power Plants,* Jonathan L. Ramseur, Specialist in Environmental Policy, Congressional Research Service, July 21, 2014

[4] The reduction in overall emissions of 25-30% below 2012 levels by 2030, or 35-40% below 2005 levels, would mean carbon dioxide emission reductions of 500-600 million metric tons below 2012 levels, and 850-950 million metric tons below 2005 levels.

12. To encourage investments of public resources to help dislocated workers and impacted communities that are traditionally tied to the coal sector make the transition to the clean energy economy.

Specific Comments

Natural Gas

Natural gas is a fossil fuel. Like coal, it is found underground, it is burned to release its energy and it is the product of eons of accumulation; therefore, it is a limited resource and not renewable. The global warming differences between coal and natural gas are a matter of degree, not of substance. Fracking, the invasive and destructive practice of extracting hitherto uneconomical pockets of natural gas, expanded greatly after 2004, when the EPA declared that the practice posed no threat. However, this conclusion was disputed even by EPAôs experts.

> Weston Wilson, a scientist and 30-year veteran of the agency, who sought whistle-blower protection, emphatically disagreed, saying that the agencyôs official conclusions were ñunsupportableò and that five of seven members of the review panel that made the decision had conflicts of interest.[5]

Nevertheless, as a result of the ñHalliburton Loopholeò in the 2005 energy bill, EPA is prohibited by law from regulating fracking. This fact continues to distort the Agencyôs analysis and undermines one of the four ñbuilding blocksò of the Clean Energy Plan.

Natural gas suffers from a series of insoluble problems. Once the gas is removed from the earth, it must be transported in trucks, compressed and delivered by pipelines where it is burned for heat and power. At each stage in this process, pollution is created. And compressor stations and electric power plants are two major pollution sources which are often overlooked.

For example, at the Richmond County Energy Complex in Hamlet, North Carolina, Duke Energy Progress operates seven combustion turbines permitted to burn either fuel oil or natural gas to generate 2,000 megawatts of electric power. But turbines are remarkable for their lack of efficiency in converting chemical energy to mechanical energy. More than 50 percent of the turbineôs power output is consumed by the turbine itself to aid combustion.[6] Two types of turbines are simple-cycle and combined-cycle. The simple cycle has a thermal efficiency of only 15 to 42 percent. Combined cycle units add a heat recovery steam generator to boost efficiency to between 38 and 60 percent. So, at best 40% of the fuel burned produces no electric power; at worst 85 % of the fuel burned produces no electric power. Of course, air pollution and global warming gases are created whether power is produced or not.

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[5] ñHow gas drilling contaminates your food,ò *Salon*, Barry Estabrook, May 18, 2011 http://www.salon.com/2011/05/18/fracking_food_supply/

[6] US EPA Air Pollution Emission Factors, AP-42, Stationary Gas Turbines, Section 3.1.2 Process Description

Another major source of air pollution from natural gas is compressor stations. Spaced along pipelines about 50 to 100 miles apart, they keep the gas moving along the pipeline from production site to end use. Natural gas is received via upstream pipeline, compressed, and then pumped into the outlet pipeline for transmission downstream. Power for these compressors is provided by internal combustion engines which use natural gas as a fuel source. These engines release huge amounts of air pollution including sulfur dioxide, nitrogen oxides, volatile organic compounds, carbon monoxide, particulate matter, hazardous air pollutants such as benzene and formaldehyde, and huge amounts of global warming carbon dioxide. For example, a single, a medium sized compressor can emit 203 thousand tons of CO_2 annually.[7]

Industry representatives tout natural gas as an environmental improvement and an economic advantage. But natural gas commerce is part of a global market, a factor which governs who gets the financial benefit and who gets the pollution. There was a 68% rise in US natural gas exports from 2008 to 2012 (from 0.9 to 1.6 trillion cubic feet), and a corresponding 27% drop in net imports (from 3.9 to 3.1 trillion cubic feet). For example, from 2009 to 2013, US imports from Canada fell by 858 billion cubic feet; meanwhile, US exports to Canada increased by 350 billion cubic feet and to Mexico by 293 billion cubic feet.[8] But natural gas is not cheap; that is, not unless the burdens of extraction, transport and use are transferred from corporate titans to the communities where the wells, pipelines, storage tanks and export terminals are located. Global warming is a planet-wide phenomenon. No matter where the gas comes from, the impact will be realized everywhere. Rising levels of greenhouse gases require a halt to the burning of all three types of fossil fuel: coal, oil and natural gas.

Nuclear

The EPA includes nuclear power under its third ñbuilding blockò for carbon reductions. However, nuclear power is a leaky vessel for hope. Nuclear suffers the twin flaws of being too expensive and too unpredictable to rescue the planet from the looming threat of global warming.

To estimate risks, nuclear engineers use ñprobabilisticò techniques. For example, to determine earthquake risk they attempt to account for all potential seismic sources in the region around the plant. The standard is ground motion with an annual frequency of $1x10^{-4}$/year, or ground motion that occurs every 10,000 years on average. Probabilistic assessments take into account what can go wrong, how bad and how likely based on current information. The problem is that probabilistic risk assessments do not account for unexpected failures. After the meltdown at Fukushima, a physicist writing for the Bulletin of the Atomic Scientists said:

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[7] Piedmont Natural Gasï Wadesboro Compressor Station, North Carolina DAQ Permit No. 10097T01 operating eight natural gas-fired reciprocating internal combustion engines each rated at 4,735 horsepower, one of the two moving gas along a 128 mile pipeline from Charlotte to Wilmington, North Carolina.

[8] Sources: BP Statistical Review of World Energy 2014, IEA Gas Medium Term Market Report 2013, accessed at http://cdn.powermag.com

> The lesson from the Fukushima, Chernobyl, and Three Mile Island accidents is simply that nuclear power comes with the inevitability of catastrophic accidents. While these may not be frequent in an absolute sense, there are good reasons to believe that they will be far more frequent than quantitative tools such as probabilistic risk assessments predict. Any discussion about the future of nuclear power ought to start with that realization.[9]

When it comes to oversight, the US Nuclear Regulatory Commission is the servant of the nuclear industry, not the public. At the behest of its master, the NRC has relaxed its regulations, allowing aging reactors to remain in operation. An independent investigation found that clogged lines, cracked parts, leaky seals, rust and other deterioration resulted in 26 alerts about emerging safety problems and may have been a factor in 113 of the 226 alerts issued by the NRC between 2005 and June 2011.[10]

Embrittlement of reactor parts is caused by high levels of radiation common in a reactor vessel. Bowing to industry pressure, the NRC now employs an innovative method, the ñMaster Curve,ò to calculate the condition of metal parts in order to keep marginal reactor vessels in service.

> A 1999 NRC review of the Master Curve noted that energy deregulation had put financial pressure on nuclear plants. It went on: ñSo utility executives are considering new operational scenarios, some of which were unheard of as little as five years ago: extending the licensed life of the plant beyond 40 years.ò[11]

Nuclear physics has not changed, but the industryôs safety margins have. Today, Master Curve technology has been incorporated into ASTM and ASME engineering codes. As a result, reactors designed for a 40 year life span are routinely being licensed by the NRC for 60 years.

Rather than being too cheap to meter, nuclear energy has become too expensive to matter. The Massachusetts Institute of Technology produced a report which found that electricity from nuclear power plants, such as those recently licensed in South Carolina and Georgia, would cost more compared to coal and natural gas, with nuclear at 6.7 cents per kilowatt-hour, pulverized coal at 4.2 cents/kWh, and natural gas from 3.8 and 5.6 cents/kWh.[12] To make the economics work, electric utilities have resorted to making its customers finance the new plants years before the first kilowatt is delivered, a method entitled ñConstruction Work In Progress,ò or CWIP. A former regulator criticized the

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[9] Ramana, NV, ñBeyond our imagination: Fukushima and the problem of assessing risk,ò *Bulletin of the Atomic Scientists,* April 19, 2011. M. V. Ramana, a physicist, is currently appointed jointly with the Nuclear Futures Laboratory and the Program on Science and Global Security at Princeton University. Ramana is a member of the Bulletin of Atomic Scientists Science and Security Board.

[10] ñU.S. nuclear regulators weaken safety rules-Regulators have been watering down standards to keep America's aging reactors operational,ò Jeff Donn, Associated Press, Jun 20, 2011

[11] *Id.*

[12] *The Future of Nuclear Power, An Interdisciplinary MIT Study*, Massachusetts Institute of Technology, 2003, ISBN 0-615-12420-8, http://web.mit.edu/nuclearpower/pdf/nuclearpower-full.pdf

scheme, saying, ñCWIP is a tax: the power of government is being used to take money from citizens in a way and for a purpose that a free market economy would not.ò[13]

Biomass

Biomass fuel is not carbon neutral. Catch-22 ambiguities stem from the fundamental irrationality of good carbon-bad carbon. The dilemma is resolved by discarding the assumption that biomass fuel is carbon neutral and admitting the premise that all carbon dioxide sourcesð biogenic and anthropogenicð cause global warming.

Many alternative energy advocates promote biomass as an answer to the problems of global warming and fossil fuels. Energy industry entrepreneurs assert that biomass plants do not add any additional pollutants to the environment and that the carbon dioxide released by combustion would be there anyway. Some even claim that biomass-powered electricity is ñemissions free.ò[14] These claims are false.

Biomass energy systems do release global warming gases. This is not in dispute. What are problematic are the assumptions and the justifications used to define thermal processing technologies as carbon neutral.

The natural carbon cycle is a virtual circle between living and non-living things. Plants depend on carbon dioxide in the air as humans and other animal life forms rely on oxygen. This plant-animal carbon cycle can rightly be called ñnatural.ò However, the combustion of organic materials in industrial processes is anything but natural and should not be considered so.

The natural carbon cycle is the result of millions of years of evolution. It is a complex process which relies on the sunÕs energy and photosynthesis. Green plants take up carbon dioxide and dispose of oxygen. Animals breathe in oxygen and exhale carbon dioxide. The natural carbon cycle is based on:

1. Respiration: glycolysis (breakdown) of glucose, hydrolysis of adenosine triphosphate releasing energy, synthesis of water and carbon dioxide (carbon and hydrogen from glucose plus inspired oxygen) and
2. Photosynthesis: photophosphorylation (splitting) of water and reduction of carbon dioxide to join hydrogen with carbon to make glucose and oxygen.

On the other hand, oxidation is a reaction in which oxygen combines chemically with another substance. (Chemically, the term also extends to the loss of electrons by an atom without combining with oxygen.) The burning oxidation path amounts to virtual short

[13] ñSuperCWIP: Taxing Utility Customers to Underwrite Investments Too Risky for Wall Street,ò Peter A. Bradford, Law Professor, former Nuclear Regulatory Commissioner, North Carolina, March 2011. Bradford is a former member of the U.S. Nuclear Regulatory Commission and former chair of the New York and Maine utility regulatory commissions. He has advised governments on nuclear power and is a member of the Keystone Center collaborative on nuclear power and climate change.

[14] From Dominion Resources, Inc. annual update: ñDimensions 2008-2009: Corporate Responsibility Report,ò page 20, available at www.dom.com

circuit of the natural carbon cycle. It lacks a corresponding short-term process akin to photosynthesis to return the carbon released to the biological loop.

Biomass proponents often rely on misleading analogies to the carbon cycle to explain how their energy facilities mimic natural processes. For example, an International Energy Agency study claims carbon emissions from biomass fuels are only 5% to 10% those of fossil fuel:

> Net carbon emissions from generation of a unit of electricity from bioenergy are 10 to 20 times lower than emissions from fossil fuel-based electricity generation (Boman and Turnbull, 1997; Mann and Spath, 2000; Elsayed *et al*., 2003).[15]

Following the chain of authorities in the studyôs references to Elsayed *et al* regarding carbon neutrality, we learn how the 90ï 95% emission reduction was arrived at:

> A major indicator of emissions is the carbon requirement which is the total CO_2 emissions from a biofuel technology, excluding those captured by the cultivation of the original source of biomass, divided by its specified energy output, measured in kg CO_2/MJ.[16] (emphasis added)

Further on in the same paper, the fundamental assumption is stated clearly:

> It should be noted that comparison of total carbon dioxide outputs is possible because of the combustion of liquid biofuels is, in effect, treated as "carbon neutral" in terms of the carbon dioxide emitted and subsequently absorbed by growing biomass.[17] (emphasis added)

In other words, getting the net carbon emissions from the generation of a unit of electricity from bioenergy to be 10 to 20 times lower than emissions from fossil fuel-based electricity generation is accomplished by *not counting them*; i.e., *treating* them as carbon neutral.

A global warming researcher said that assuming from the outset that biomass combustion is carbon neutral means that a forest would have the same carbon footprint whether it is standing or cut down. Plainly, the trees are more beneficial standing for ecological reasons. Less obvious is the impact of the unjustified assumption in carbon footprint life-cycle assessments. He states:

> Most guidance for carbon footprinting, and most published carbon footprints or

[15] IEA Bioenergy Task 38 Greenhouse Gas Balances of Biomass and Bioenergy Systems, Matthews and Robertson, Second edition, ñAnswers to ten frequently asked questions about bioenergy, carbon sinks and their role in global climate change: 1.What is the difference between CO2 emissions from bioenergy and from fossil fuels?ò page 2, http://ieabioenergy-task38.org/publications/faq/, accessed 5 March 2010

[16] Carbon and Energy Balances for a Range of Biofuels Options, Elsayed, MA et al, Project No. B/B6/00784/REP, URN 03/836, Sheffield Hallam University Resources Research Unit, March 2003, page 19 http://www.forestresearch.gov.uk/pdf/fr_ceb_0303.pdf/$FILE/fr_ceb_0303.pdf, accessed 5 March 2010

[17] *Id.*

> LCAs [life-cycle assessments], presume that biomass heating fuels are carbon neutral. However, it is recognised increasingly that this is incorrect: biomass fuels are not always carbon neutral. Indeed, they can in some cases be far more carbon positive than fossil fuels.[18]

The assumption that biomass is carbon neutral tends to cut short systematic comparisons with fossil fuels by automatically excluding the impact of biomass carbon dioxide emissions on global warming. Such analyses are essential to prevent unintended consequences such as investments of capital and other resources in false solutions, disruption of agricultural economies caused by overproduction, ecological damage caused by deforestation, negative public health impacts caused by air pollution and, of course, more destructive global warming.

Conclusion

The EPAôs reliance on nuclear power, biomass and natural gas are misplaced. Therefore, we recommend that the EPA abandon its assumptions regarding these three methods of generating electricity. Without this excess baggage, the Clean Power Planôs carbon reduction goals are still achievable, at less cost and without damage to the environment and public health. The Best System of Emissions Reductions need not be limited to the EPAôs proposed building blocks so long as states meet their goals. The sun provides 7,000 times more energy to the earthôs surface than current global energy consumption.[19] Plainly, capturing but a small fraction of this energy potentialð utilizing geothermal, wind and solar methodsð would vastly outweigh the potential of fossil coal, oil and natural gas without resorting to biomass or other polluting forms of power such as nuclear.

Respectfully,

Louis A. Zeller
Executive Director

[18] Johnson E, ñGoodbye to carbon neutral: Getting biomass footprints right,ò Environ Impact Asses Rev (2008), doi:10.1016/j.eiar.2008.11.002

[19] Nielsen, R. 2005, 'Solar Radiation', http://home.iprimus.com.au/nielsens/