



Testimony of Caleb Stewart Rossiter, Ph.D.,
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Committee

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“Analysis of DEP’s Modeling of the Economic, Health, and
Environmental Impacts of the Regional Greenhouse Gas Initiative”

Chairman Metcalfe, Chairman Vitali, Members of the Committee, it is an honor to have this opportunity to discuss with you the possible impacts of your state’s role in what I consider the most important public policy issue of today, the balancing of energy needs and environmental protection. Not just quality of life, but lives themselves are in the balance, whichever way you lean. So before leaning, it’s important to know why.

I am a former professor of statistics, mathematics, and public policy at American University. I also worked for many years in and around the U.S. Congress on foreign policy, particularly toward Africa. My CV is available on my website.¹

Having been actively involved in the climate change debate in both of my careers – teaching climate statistics and modeling, and supporting U.S. policies to improve access to electricity in Africa from its current one-third of households – in 2016 I was invited to join an alliance of 55 climate scientists and energy economists called the CO2 Coalition. When the founder became President Trump’s climate adviser on the National Security Council in 2018, I accepted the position of executive director. I am happy to report that when I retire at the end of this year, I will be replaced by a talented Pennsylvanian who has testified before this committee in the past, geologist Gregory Wrightstone.

Mark Twain famously identified three descending gradations of falsehood: lies, damn lies, and statistics. Analyzing the claims by the Department of

¹ <http://calebrossiter.com/cv.html>



Environmental Protection about the effects of Pennsylvania's participation in the Regional Greenhouse Gas Initiative, I felt like adding an even lower class to that. Your DEP, charged with providing unbiased analysis to guide policy-makers, traffics in lies, damn lies, statistics...and models.

As a professor I taught not just statistics and mathematical modeling, but also their use in cost-benefit analysis for public policy. As I constantly told my students, the core responsibility of all of us in these fields is to search for truth, not proof. These are tools to help us evaluate a claim, not stake one. We must test a variety of assumptions, not just those that make a particular case. We must include all the costs, not just all the benefits, to find the net effect of a policy decision like RGGI.

My testimony today will cover just a few of the ways in which DEP is committing public policy malpractice by searching for proof, not truth. DEP has provided you with a lawyer's brief, rather than an accountant's analysis. This is the sort of thing that gives statistics and modeling a bad name, and encourages the public to distrust rather than appreciate the useful projections of experts in these fields.

Statistics and modeling are often combined into one technique, which we broadly call multiple regression, or, when applied to economics, econometrics. Using the mathematically-derived equations of probability, which remarkably match the reality of distributions of actual events in the real world, multiple regression controls for all variables so that you can see the independent effect of each one.

But DEP dispenses with this technique. It uses models that can't distinguish between correlation and causation, and simply generate projections of impact based on assumptions, without controlling statistically for how different variables interact with each other, and sum up benefits without considering costs to arrive at a net figure. That's why I've added models to Mark Twain's list as a separate, particularly misleading item.

My conclusion is that if you properly included reasonable assumptions, followed the normal statistical techniques that control for other variables so that you can distinguish simple correlation from true causation, and summed up both costs and benefits, you would find that the RGGI is an act of economic, health, and environmental suicide. It will raise electricity prices, increase health problems and mortality, and damage the environment. Ironically, even if it were expanded to the



entire nation and the entire world, a RGGI regime would be very likely to have minimal effect on climate variables or even on the level of warming gases in the atmosphere.

So, let's get to it, starting with the lead picture on the DEP website for the RGGI. Shamefully, incorrectly, in contradiction to all the peer-reviewed science and the conclusions of the UN body that studies the impact of greenhouse gases on climate, DEP starts its cascade of argumentation with a photo of emergency workers surveying a flooded town.²



As a professor of statistics and public policy for many years, I always taught my students about the classic Latin enemies of logic. This one is called *post hoc ergo propter hoc*. That means that since one thing happens after another occurs, it must be caused by it; or, “correlation is causation.” CO₂ concentrations in the atmosphere have increased due to industrial energy emissions since 1900 from three parts per million to four. We have a flood. The increase must be the cause of the flood. This is an example of one of the most prevalent and dangerous errors in human learning.

But weather is not climate change. The UN reports that there has been no statistically significant change in rates of extreme weather, including floods, since the era in which CO₂ emissions were large enough to cause measurable warming began around 1950.³ Let me be clear: as I have testified before the U.S. Congress,

² <https://www.dep.pa.gov/Citizens/climate/Pages/RGGI.aspx#>

³ <https://co2coalition.org/2020/06/16/climate-statistics-101/>;

<https://co2coalition.org/publications/equal-warming-1900-to-1950-versus-1950-to-2018-why-the-un-knows-the-first-half-was-natural/>



the rates per decade of floods, sea-level rise, droughts, wildfires, tornadoes, and hurricanes are no higher today in the United States, and in the world, than they were 100 years ago.⁴

The DEC implication that CO₂ emissions have caused more floods and its very carefully cherry-picked claim that, “Between 1958 and 2010, the Northeast U.S. saw more than a 70% increase in precipitation falling in very heavy rain events” are nothing but misdirection. Even if true, this claim in itself provides no backing for the implication that this was a trend rather than a typical fluctuation, and that if it was a trend, its cause was CO₂-driven warming.

We are not in a CO₂-driven climate crisis; that is the scientific fact. Some models predict we may be in one in a hundred years, but even their estimated damages pale next to the fossil-fueled increase in wealth we will have to manage them.⁵ And remember, there are benefits to CO₂ emissions as well, since the molecule is a crucial plant and plankton food that improves crop and ocean productivity.⁶

ECONOMY

Now, to economics. RGGI is not a market-based approach, as claimed on the DEP website. We already have an energy market based on price and technology, and the result is that over 80 percent of American energy, and world energy, comes from fossil fuels. Why? Because they are more inexpensive, reliable, and efficient than the current alternatives.

RGGI is a market-distorting approach. Indeed, its entire purpose is market distortion of its states’ energy that is generated by the electricity sector. It exists to tax affordable, reliable fossil fuels even more than they already are net taxed by, as a recent study by our coalition finds, \$50 billion in the United States, \$363 billion in the other industrialized democracies, and \$102 billion in the so-called BRIC

⁴ <https://www.congress.gov/116/meeting/house/109352/witnesses/HHRG-116-GO28-Wstate-RossiterC-20190430-U1.pdf>

⁵ <http://co2coalition.org/publications/the-social-cost-of-carbon-and-carbon-taxes-pick-a-number-any-number/>

⁶ <https://co2coalition.org/2019/02/25/new-white-paper-what-rising-co2-means-for-global-food-security/>; <http://co2coalition.org/2020/06/01/ocean-health-is-there-an-acidification-problem/>



countries – Brazil, Russia, India, and China.⁷ In turn, RGGI subsidizes wind and solar with preferential mandates even more than they already are subsidized. Why? Obviously, to get states to use the so-called “renewable” sources of electricity.

I put that term in quotation marks to indicate that there is nothing renewable about so-called renewable energy. The Sun and wind are indeed free and recurring daily, but the infrastructure needed to turn their energy into electricity is just as fossil-fuel intensive, and so just as generative of warming gases and real pollutants like sulfur dioxide, nitrogen oxide, fly ash, and particulate matter, as fossil fuels. Here’s why.

* To have wind turbines and solar panels, and the batteries to store – very poorly at present technologies – the intermittent, expensive, and inefficient energy that wind and solar produce, minerals have to be mined in horrific conditions in the Democratic Republic of the Congo and slightly better conditions at other sites in central and southern Africa. All of this activity is powered by, you guessed it, fossil fuels.

* Then the minerals have to be processed into a usable form, transported to America, and built into final products which are then transported again and erected on huge platforms requiring massive amounts of concrete – another major source of CO₂ emissions, by the way.

* Then the initial electricity must be transformed for lengthy transmission lines that bring it to populated areas thousands of miles from the source.

* And, to top it off, the intermittent electricity, to date, must be backed up with largely fossil-fueled generation of electricity on demand. All that expense, all that CO₂ generated to create the “renewable” power, all those subsidies paid for by taxpayers, and you still need your gas and coal-fired power plants to keep the lights on. Detailed analysis of this phenomenon can be found in the work of engineer Norm Rogers, a member of our CO₂ Coalition.⁸

⁷ <https://co2coalition.org/2020/07/23/study-finds-fossil-fuels-arent-subsidized-theyre-overtaxed/>

⁸ <https://www.climateviews.com/index.html>



It's really a bad joke so far, which makes it appropriate that one of the easiest explanations to follow comes from a funny guy, the left-leaning film-maker Michael Moore, in his new documentary, Planet of the Humans. Moore, like your Governor Wolf, is a true believer in a fossil-fueled climate crisis, but he knows how to count: the film shows, hilariously, how renewables can't possibly meet our energy needs, so his solution to the supposed climate crisis is to slash our energy use and economic growth. My advice is to take his first point to heart, and run from his devastating solution to what is so far a non-problem.

Let's look at what DEP says about the economic impact of raising the price of energy: "Economic modeling shows that participating in RGGI will lead to a net increase of more than 27,000 jobs and add \$1.9 billion to the Gross State Product in Pennsylvania."⁹

Huh? You are going to raise the true cost, and probably the market price, of energy dramatically, reduce reliable fuels in favor of intermittent ones, and that's going to increase jobs and productivity? How's that working out for California this week? Renewable mandates have taken an effective energy regime in California and turned it into one that even some of the more successful African countries, like South Africa and Egypt, would reject.

Renewable energy, once the government subsidies are factored in, currently costs four times as much per kilowatt-hour as natural gas-fired electricity.¹⁰ When states are mandated to provide renewable electricity, their budgets are distorted to support it rather than routine maintenance, let alone expansion, of cheaper, more reliable, more efficient fossil-fueled electricity. The result will be blackouts and misery, and reduced economic activity.

We are told by DEP that the full analysis will be available soon. I can't wait ... But for now, we are directed to the Regional Economic Models Inc., or REMI, and its input-output model. REMI is part of the LEDS global partnership. LEDS, a play on the LED, or Light-Emitting Diode bulbs, stands for Low Emissions Development Strategies. It's part of the Paris Agreement that President Trump wisely renounced,

⁹ <https://www.ahs.dep.pa.gov/NewsRoomPublic/articleviewer.aspx?id=21833&typeid=1>

¹⁰ <http://co2coalition.org/publications/the-social-cost-of-carbon-and-carbon-taxes-pick-a-number-any-number/>



and is funded by developed country governments to encourage poor countries to do as we say and not as we did.

These countries are told to reject our fossil-fueled route to increased wealth and another 20 years of life expectancy. This is a prime example of what has been called Eco-imperialism or Green Colonialism, and includes America outsourcing its mining to the Third World, the European Union banning imports of genetically-modified crop varieties from Africa, and foreign aid donors forcing African governments not to use DDT to reduce the transmission of malaria, or other pesticides to fight locusts.¹¹

Despite the efforts of LEDS, by the way, developing countries are still building coal plants, lots of them, as their economies grow and hence their life expectancy increases. That's because for them, coal power is so much cheaper and easier to operate and maintain than the alternatives. Unfortunately, given our current restrictions, these countries are turning to China, and not us, when we have the better cleaning technologies available.

Input-output models like REMI's change a single parameter, in this case the addition of the money taken from electricity providers in RGGI auctions, and then estimate the effect as it cascades through the economy for a period of time.¹² Sure, spending that money creates growth and jobs. But remember, that exact same amount of money is also removed from the economy as the effective tax is passed along to consumers of the electricity in rate hikes or absorbed by the utilities, so its impact on growth and jobs is immediately cancelled out by the spending on other goods and services or investment that is foregone. Your RGGI estimates incorrectly count only benefits and not costs. In addition, the models ignore the loss of competitiveness for your industries and other businesses as the increased cost of energy raises their prices.

¹¹ <https://www.amazon.com/Eco-Imperialism-Driessen-Paul-Merril-Paperback/dp/B00E2RNZ18>; <https://www.wsj.com/articles/africas-locust-plague-shows-the-danger-of-green-colonialism-11582586979>

¹²

https://www.analysisgroup.com/globalassets/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_april_2018.pdf



And please remember that input-output models are dependent on thousands of parameter estimates that be controlled by the groups that run them. The father of climate models was the famed mathematician and Cold War military theorist John von Neumann, who tried and thankfully failed to see if we could cause drought in the Soviet Union. He famously joked, “with four parameters I can draw an elephant, and with five I can make him wiggle his trunk.” That claim was recently proved true in a tongue-in-cheek paper by Jürgen Mayer of the Max Planck Institute.¹³

Mr. Chairman, I recommend to the Committee, and to DEP, a detailed analysis of RGGI’s magical thinking that raising energy costs leads to economic growth, by the Cato Institute.¹⁴

HEALTH

Now let’s turn to the modeled health claims:

DEP makes an estimate of the monetized value of health benefits from RGGI’s reductions not in CO₂, which is not damaging to human health, but in pollutants like sulfur dioxide, nitrogen oxide, and particulate matter that are associated with fossil fuels. This modeling fails to follow the two core rules of cost-benefit analysis: (1) your calculations must capture benefits only from the policy change itself, and not from trends caused by other factors, and (2) you must calculate both the costs and the benefits of the policy change. Leaving aside estimates of monetization, which are inherently problematic, let’s take something real that the DEP models: deaths from coal-based pollutants.

DEP estimates that up to 639 premature deaths will be avoided by 2030 because of Pennsylvania’s participation in the RGGI. But that will mostly be due not to RGGI policy, but rather the dramatic drop in the price of natural gas-generated electricity as compared to coal as hydraulic fracturing became more and more successful.

¹³ <http://co2coalition.org/2019/09/24/why-climate-models-cant-guide-energy-policy-there-are-too-many-free-parameters-for-the-alarmist-cooks-to-bake-in/>

¹⁴ <https://www.cato.org/cato-journal/winter-2018/review-regional-greenhouse-gas-initiative#related-content;>
https://www.analysisgroup.com/uploadedfiles/content/insights/publishing/2018_hibbard_tierney_darling_cullinan_an_expanding_carbon_cap_and_trade_regime.pdf



This estimate clearly ignores the costs of RGGI when it increases the cost of natural gas-fired electricity in the future, which its lower and lower auction amounts are intended to do.

Affordable heating saves far more lives than coal-fired electricity loses! In fact, a 2019 study for the National Institutes of Health estimated that 11,000 lives have been saved in America each year from the effect of fracking on heating costs.¹⁵ When costs are low, more people use enough heat to stay healthy. When costs are high, more people cut back on the heat that protects them from respiratory diseases.

Natural gas saves lives. Thank you, Pennsylvania, for producing it. As a native of New York's Southern Tier, I come to you embarrassed by my state's free-riding on your production, and horrified by my state's resistance to allowing you to share your life-saving product with New England through pipelines, rather than far more dangerous trucks and trains.

Failure to do a full cost-benefit mortality analysis for a policy change, or even, in this case, a production change due to other factors, is inexcusable in your Department of Environmental Protection. Get a refund!

The same goes for the claimed 30,000 less hospital visits from asthma from ground-based ozone and other respiratory problems. DEP did not factor in increased hospitalization for deadly pneumonia and bronchitis as a result of more expensive heating. This is an obvious cost, based on the 2019 study for NIH. In addition, the NOx that creates ozone, which then stimulates asthma, can be successfully "scrubbed" to low levels (along with sulfur dioxide and particulate matter) with modern coal power technology (and modern vehicle catalytic converters).

The latest coal-cleaning technology is in operation in America in only one plant, the Turk Plant in Arkansas, because it was the only one under construction when the natural gas revolution exploded in the late 2000's and made coal less competitive. DEP failed to estimate how much it would cost to retrofit coal generation, but my guess is that it would be a lot cheaper to handle this with better

¹⁵ <https://www.nber.org/papers/w25681.pdf>



technology rather than by hamstringing the economy, which has its own health impacts.

In sum, DEP's health model is a brief for one side, not a balanced analysis that you can use to make policy decisions.

ENVIRONMENT

Finally, let's take DEP's environmental claims. There is no entirely clean source of power. One should, and increasingly can, find cost-effective ways to reduce the effects of making energy, but again, the environmental costs and benefits, all of them, must be calculated to get a fair policy picture. For example, as you reduce emissions from coal and natural gas electricity under RGGI, you will have to compensate with increased wind, solar, hydro, and nuclear power.

I have already explained why some of the "renewables" themselves require massive amounts of fossil-fueled energy in production and transmission. And I have explained why the attendant emission of CO₂ is not, in itself, an environmental problem. But the construction of dams – say, in the Pine Creek Gorge – or wind turbines – say throughout your state's Game Lands – would indeed have indeed tremendous environmental costs.

And while the solar-powered grid electricity you would use comes from states that are thousands of miles away, as Americans we can't just ignore their environmental costs. As Johnny Cash sang of trucking, there ain't no easy run when it comes to providing Pennsylvanians with affordable, reliable energy. There will always be tradeoffs.

CONCLUSION

Let me conclude by exploring the dubious basis for your RGGI policy once more. Governor Wolf justified his executive order for RGGI by dramatically claiming that average temperature in Pennsylvania has increased 1.8 degrees Fahrenheit in the past 110 years.¹⁶ This estimate is consistent with the national and world surface temperature data sets.

¹⁶<https://www.oa.pa.gov/Policies/eo/Documents/2019-07.pdf>



But the global increase began with an entirely natural warming after the Little Ice Age ended in the 18th century. As mentioned earlier in my testimony, fully half of the measured increase came from 1920 to 1950, which was before CO₂ levels were large enough to cause measurable warming. National and global warming stopped from 1950 to 1980, and then resumed. The UN climate body is only confident that half of the recent half of the total warming since 1900, which occurred from 1980 to today, came from industrial CO₂. Pretending that all the warming for 110 years was human-caused is misleading. A quarter is more likely.

And please, Pennsylvania, note that RGGI errs scientifically in including methane in the warming gasses it controls. As two of our coalition's atmospheric physicists recently showed in a major paper on the spectroscopy, or warming potential, of methane, the "radiative forcing" of each methane molecule is 30 times larger than that of a carbon dioxide molecule, but the increase in global methane is *300 times less* than that of carbon dioxide. As a result, methane is only one tenth (30/300) as powerful in forcing as carbon dioxide, which itself adds about a degree Celsius to global warming as it doubles in the atmosphere. A methane doubling would provide only a tiny fraction of total greenhouse forcing.¹⁷

Thank you for your attention, and I look forward to hearing your perspectives and taking your questions.

¹⁷ <https://co2coalition.org/2019/11/26/methane-and-climate/>

