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Testimony of Thomas D Schuster
Representing the Sierra Club
Before the House Environmental Resources and Energy Committee
On the Effects of Carbon Emissions and the Social Cost of Carbon

I. Introduction

Good morning, my name is Tom Schuster, and I am a Senior Campaign Representative for the Sierra Club in Pennsylvania. The Sierra Club is the oldest and largest grassroots non-profit environmental organization in the country. Our mission is to explore, enjoy, and protect the wild places of the Earth and to practice and promote the responsible use of the Earth's resources and ecosystems. We have over 30,000 members across every county in Pennsylvania, and these members have a strong interest in protecting the stability of our climate by reducing and ultimately eliminating greenhouse gas emissions including carbon dioxide and methane that are released during the extraction and combustion of fossil fuels.

Our Commonwealth is a significant emitter of climate disrupting carbon pollution. We rank second in the nation in fracked gas production and third in coal production.[1] We are also globally significant polluters: as a commonwealth we emitted more energy-related carbon pollution in 2015 than 172 of the 194 nations that signed on to the Paris Climate Agreement.[2] We therefore have a moral imperative, particularly in the absence of meaningful federal action, to do our fair share to significantly reduce greenhouse gas emissions within our borders and add to multi-state and international efforts to avoid potentially catastrophic levels of climate disruption.

II. Effects of Carbon Pollution Generally

Two recent scientific assessments have been published that detail the urgency of our call to action. In October 2018 the Intergovernmental Panel on Climate Change (IPCC) released a Special Report on the impacts of global warming.[3] This report highlights the projected differences in planetary impacts between a 1.5^{o} C warming scenario and 2.0^{o} C of warming. The differences are stark, including the complete loss of coral reefs and the fisheries they support,

[1] US Energy Information Administration, 2017 production.
[2] International Energy Administration Atlas of Energy.
[3] IPCC, 2018: Summary for Policymakers. In: Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [V. Masson-Delmotte, P. Zhai, H. O. Pörtner, D. Roberts, J. Skea, P. R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, T. Waterfield (eds.)]. World Meteorological Organization, Geneva, Switzerland, 32 pp.

and additional sea level rise that threatens many millions of coastal residents as well as the very existence of many island nations. Avoiding the 2.0° scenario or worse will require "rapid and far reaching" efforts to reduce emissions by 45%[4] by 2030, and achieve net-zero emissions by 2050. Because emissions to date have already saddled us with 1° of warming, the Co-Chair of the IPCC Working Group that authored the report went so far as to say that "*The next few years are probably the most important in our history*."[5] [emphasis added]

The next month, the United States Global Change Research Program released the Fourth National Climate Assessment (NCA4).[6] This report finds that climate change is no longer a future threat but that we are already dealing with its impacts as a nation. These impacts range from more extreme wildfires, more frequent intense and damaging storms exemplified by recent catastrophic hurricanes, and changes in temperature and rainfall patterns that cause significant agricultural losses. The report begins with this statement:

> Earth's climate is now changing faster than at any point in the history of modern civilization, primarily as a result of human activities. The impacts of global climate change are already being felt in the United States and are projected to intensify in the future—*but the severity of future impacts will depend largely on actions taken to reduce greenhouse gas emissions and to adapt to the changes that will occur*.[7] [emphasis added]

III. Effects of Carbon Pollution in Pennsylvania

Several studies have projected the impacts that climate change will have here in the Commonwealth, including by the Department of Environmental Protection (DEP) (as mandated by Act 70 of 2008),[8] the US Environmental Protection Agency (EPA),[9] and the National Conference of State Legislatures (NCSL).[10] Some key findings are as follows:

- Our climate will be warmer and wetter, with an estimated 3°C (5.4°F) temperature increase and 8-10% annual precipitation increase by 2050.
- Tidal portions of the Delaware River could rise enough to inundate parts of Penn's Landing, the Philadelphia Airport, and nearby neighborhoods during regular high tides. Saltwater could move upstream far enough to contaminate major drinking water intakes.
- More frequent heavy rain events will cause regular flash flooding along inland rivers throughout the state. In areas with many steep slopes, landslides will be more common due to the combination of heavier rains and more frequent winter thawing. Higher

[4] Relative to 2010 levels.
[5] IPPC Press Release 10/8/18. Accessed at http://www.ipcc.ch/pdf/session48/pr_181008_P48_spm_en.pdf.
[6] USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II: Report-in-Brief [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 186 pp.
[7] USGCRP at p24.
[8] Shortle, J, D Abler, S Blumsack, A Britson, K Fang, A Kemanian, P Knight, M McDill, R Najjar, M Nassry, R Ready, A Ross, M Rydzik, C Shen, S Wang, D Wardrop, S Yetter. 2015. Pennsylvania Climate Impacts Assessment Update. The Pennsylvania State University, University Park.
[9] US EPA. 2016. What Climate Change Means for Pennsylvania. EPA 430-F-16-040.
[10] NCSL. 2008. Pennsylvania: Assessing the Costs of Climate Change.

temperatures generally mean stronger wind events that lead to more power outages. Precipitation from extremely heavy storms has already increased 70% in the Northeast region since 1958.

- Rising water temperatures make algal blooms on Lake Erie, which can be toxic to fish and humans, more frequent and severe.
- Agricultural production is expected to suffer, with loses expected to be greatest in corn (PA's most important crop) as well as milk and beef (which together account for a third of Pennsylvania's $7.4 billion in annual agricultural production).
- Human health will be impacted in a variety of ways. Premature deaths due to extreme heat will increase. Ground level ozone (or smog) levels will increase with temperature and exacerbate respiratory problems. New insect-borne diseases are likely to emerge. As winters warm, more ticks become infected with Lyme disease making humans more susceptible when they go outside.
- Pennsylvania's downhill ski and snowboard resorts are not expected to remain economically viable past mid-century.

The National Weather Service declared 2018 the wettest year on record across Pennsylvania, with the previous record having been set just seven years before.[11] This has had some disastrous consequences, including widespread flash flooding and a weather-related landslide that caused a gas pipeline explosion in Beaver County.[12] Unfortunately, years like this are only going to become more normal if we fail to mitigate climate disruption.

IV. The Regional Greenhouse Gas Initiative

The Regional Greenhouse Gas Initiative (RGGI) currently has nine participating states, with New Jersey set to rejoin in 2020, and Virginia expected to link to RGGI in 2021. Participating RGGI states set limits of comparable stringency on carbon dioxide pollution from power plants, and those limits decline over time. Generators must hold and retire one allowance for each ton of CO2 emitted. If allowances are auctioned or sold to generators, the proceeds can be reinvested in beneficial ways.

RGGI has been in effect since 2008, and a recent review[13] of the program's first ten years found that:

- CO2 emissions from RGGI-covered power plants have fallen by 47%, outpacing the rest of the country by 90%;
- Electricity prices in RGGI states have fallen by 5.7%, while prices have increased in the rest of the country by 8.6%;
- GDP of the RGGI states has grown by 47%, outpacing growth in the rest of the country by 31%;

[11] https://twitter.com/NWSStateCollege/status/1089926448809422849/photo/1

[12] Davidson T and T LaRussa, "Heavy rain contributed to Beaver County pipeline blast" Tribune Review, 9/10/18. https://triblive.com/local/regional/14064921-74/heavy-rain-contributed-to-beaver-county-pipeline-blast

[13] Acadia Center, 2019, The Regional Greenhouse Gas Initiative: 10 Year Review. Available at: https://acadiacenter.org/wp-content/uploads/2019/09/Acadia-Center_RGGI_10-Years-in-Review_2019-09-17.pdf

- RGGI states have generated $3.2 billion in allowance auction proceeds, the majority of which have been invested in energy efficiency and renewable energy programs; and
- RGGI-driven reductions in co-pollutant emissions have resulted in over $5.7 billion in health and productivity benefits.

Sierra Club recently asked Resources for the Future to analyze a number different scenarios in which Pennsylvania limits carbon emissions in its power generation sector and links to RGGI. A summary of that research is attached. Some key findings through 2026 include:

- *All scenarios produce significant carbon dioxide pollution reductions relative to business as usual.* Many have noted that Pennsylvania's power sector carbon emissions have declined in recent years as power from fracked gas replaces power from coal. However, this analysis indicates that going forward, gas is projected to replace most of our existing nuclear generation in the absence of any carbon limits. This would lead to significant carbon emissions increases. A carbon limit effectively prevents the retirement and replacement by gas of most of our nuclear fleet. It also stimulates modest additional investment in renewable energy.
- *Electricity cost increases are minimal, and in some scenarios costs go down.* The worst case scenario from a cost perspective increases the average residential electric bill by about $0.32 per month, or about $3.80 per year. This is about a tenth of the estimated cost of HB 11, which is intended to prevent nuclear plant retirements. That scenario assumes that allowance proceeds are directed to the general fund, or otherwise spent on projects unrelated to energy. If instead the proceeds are invested in a combination of energy efficiency projects and customer bill rebates, the average residential bill is projected to ***decrease by about $1.45 per month,*** or over $17 per year.
- *Pennsylvania remains a major electricity exporter in all scenarios, and exports may increase under certain circumstances.* If allowance proceeds go to the general fund, exports are projected to decrease about 17% relative to the baseline, but would remain one of the highest export levels in the country. On the other hand, if allowances are allocated directly to in-state generators based on their percentage of statewide generation, exports are projected to increase by nearly 9%, as the allocation serves as an incentive for low- and zero-emission generation in Pennsylvania relative to neighboring states.
- *The carbon cap increases the effect of the Alternative Energy Portfolio Standard (AEPS), but cannot replace it.* In most scenarios, new in-state clean energy generation increases in the range of 16-23% relative to the baseline, while total regional clean energy is not significantly impacted. However, if the AEPS were to be repealed in combination with the carbon cap as some have suggested, in-state clean energy generation is expected to decline slightly while regional clean energy would decline more significantly.[14] The AEPS and the carbon cap are complimentary policies: the AEPS

[14] The reason for the more pronounced regional decline is that existing in-state clean energy that sells Alternative Energy Credits (AECs) to PA utilities would now have to sell them to utilities in other states, which in turn would decrease the ability of credits created in those states to drive new clean energy development.

drives clean energy development but does not necessary reduce emissions in the near term, while the carbon cap reduces emissions but does not necessarily drive clean energy development in the near term. When the policies are combined, we can achieve both objectives, and the compliance cost for each policy is reduced.

V. Policy Considerations and Equity

Sierra Club supports a carbon emissions cap that is linked to RGGI as one necessary step in a suite of policies to decarbonize our economy consistent with the timeline detailed in the latest IPCC special report. Because the RGGI model rule is a market-based, sector-wide policy, it does not guarantee that carbon emissions or co-pollutants from any particular facility will be reduced, and as a result there are many equity considerations to make in structuring the policy. For example, to the extent that trading of allowances is permitted, there should be limits that prevent any particular facility from increasing its co-pollutants, and to ensure that environmental justice communities that are already overburdened with pollution see reductions in their exposure. There should be reinvestment of revenues collected from carbon allowances in clean energy and efficiency projects, with a focus on projects that benefit lower income communities and consumers. Some of the allowance revenues should also be reserved to provide investments that benefit communities and workers where extraction of coal and fracked gas declines or power plants retire in order to aid with their transition.

VI. Conclusion

Climate change is here today, and we are already feeling its effects. As with many social problems, the negative impacts of climate change are and will continue to be disproportionately felt by lower income and marginalized communities,[15] as well as those who rely on the land to make a living. The latest scientific reports feature an unprecedented sense of urgency, and the cost of inaction in Pennsylvania is high: over $10.6 billion in 2015 from Pennsylvania emissions alone, by a very conservative estimate, and increasing every year.[16] Fortunately, we have the policy tools to cut carbon pollution in a very cost effective way, and complimentary investments in clean energy, efficiency, and economic diversification and transition have the potential to create hundreds of thousands of jobs in the Commonwealth if we decide to chart that course.

Attachment: Burtraw, D, M Domeshek, Anthony Paul, and Paul Picciano. 2019. Options for Issuing Emissions Allowances in a Pennsylvania Carbon Pricing Policy. Resources for the Future: Issue Brief 19-08.

[15] USGCRP at p12.

[16] This estimate is based on a Social Cost $36/ton for carbon dioxide and $1000/ton for fugitive methane for 2015 emissions. For more information on Social Cost of Carbon methodology and proper application in a policy context, see: Paul et al, 2017, The Social Cost of Greenhouse Gases and State Policy, Institute for Policy Integrity, NYU School of Law.