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Introduction

Good morning Chairman Metcalfe, Chairman Vitali, and members of the House Environmental Resources and Energy Committee. I want to thank you for inviting me to join this discussion today, and to convey the Pennsylvania Environmental Council's (PEC) appreciation for the General Assembly's consideration of climate and energy policy issues.

My name is John Walliser and I am a senior vice president with PEC, a statewide nonprofit project and policy organization that, for nearly fifty years, has worked with public and private partners to advance meaningful and collaborative solutions for Pennsylvania. This includes the combined issues of energy policy and climate change where, over the past several years, we have examined decarbonization of electricity production in the Commonwealth.

These submitted remarks are divided into two parts: (1) the reality of climate science and its stark implications; and (2) steps Pennsylvania should take to move our state toward a net zero carbon future.

Climate Reality and the Need for Deep Reductions in Greenhouse Gas Emissions

Climate change is occurring now, and the costs and consequences will only magnify from inaction. And while climate change is a global issue, Pennsylvania has an essential role to play. It is in our own best interests to do so.

The science-based targets in the 2015 Paris Agreement – keeping the increase in global average temperature this century to well below 2°C above pre-industrial levels, with the aim of limiting the increase to 1.5°C – are generally recognized as reflecting what is necessary to significantly reduce the risks and impacts of climate change. The world is already experiencing impacts from the current warming of about 1°C, so the 1.5°C and 2°C targets do not necessarily represent what is “safe” – just what will give humanity a meaningful chance of avoiding the worst impacts of climate change.

In October 2018, a special report from the Intergovernmental Panel on Climate Change (IPCC) underscored that unless urgent action is taken to curb greenhouse gas emissions, the most pronounced effects of climate change may be unavoidable.¹

In November 2018, the U.S. Global Change Research Program released the fourth National Climate Assessment, which unequivocally warned that climate change could imperil U.S. public health, communities, agriculture, and economy, and lead to hundreds of billions of dollars of costs and damages annually.² This program is led by the National Oceanic and Atmospheric Administration in conjunction with 13 federal agencies (including the Departments of Commerce, Defense, Energy, and Agriculture, the National Science Foundation, among others) and with input from more than 300 federal and non-federal experts.

¹ Intergovernmental Panel on Climate Change, *Global Warming of 1.5°C*, 2018. <https://www.ipcc.ch/sr15/>

² U.S. Global Change Research Program, *Fourth National Climate Assessment: Volume II: Impacts, Risks, and Adaptation in the United States*, 2018. <https://nca2018.globalchange.gov/>

Let me call out text from the Introduction section of that report:

“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.”

...

“Climate-related risks will continue to grow without additional action. Decisions made today determine risk exposure for current and future generations and will either broaden or limit options to reduce the negative consequences of climate change. While Americans are responding in ways that can bolster resilience and improve livelihoods, neither global efforts to mitigate the causes of climate change nor regional efforts to adapt to the impacts currently approach the scales needed to avoid substantial damages to the U.S. economy, environment, and human health and well-being over the coming decades.”³

While U.S. emissions of carbon dioxide (CO₂) had, on the whole, decreased over the past decade due to a number of factors – including economic recession and decreased demand, fuel switching from coal to gas along with coal plant closures, increased energy efficiency and conservation measures, and the growth of renewable and distributed energy generation – that decline reversed markedly in 2018.

In December 2018, the Global Carbon Project – representing scientists from more than 50 academic and research institutions – issued findings that emissions of greenhouse gases are rapidly accelerating globally, outpacing current decarbonization efforts.⁴ This was substantiated by the International Energy Agency (March 2019), which noted that while emissions from all fossil fuels increased, the power sector accounted for nearly two-thirds of emissions growth.⁵ In January of this year, the Rhodium Group released preliminary estimates showing that, after three years of decline, U.S. CO₂ emissions rose sharply in 2018 despite coal plant closures⁶ (this also underscores the fact that coal plants are already closing and will continue to do so regardless of climate policy). In its state Climate Change Action Plan,⁷ the Department of Environmental Protection’s analysis also projected an increase in carbon emissions in our Commonwealth from electricity generation in future years.

If Pennsylvania’s energy generation shift continues with growth in natural gas, the increase in CO₂ emissions will continue – particularly if gas displaces nuclear. To compound this problem, we do not

³ Both text excerpts are taken from the Introduction Section on page 34 of the Report.

⁴ Global Carbon Project, *Carbon budget and trends 2018*, 2018. <http://www.globalcarbonproject.org/carbonbudget/>

⁵ <https://www.iea.org/geco/emissions/>

⁶ Rhodium Group, *Preliminary US Emissions Estimates for 2018*, January 2019. <https://rhg.com/research/preliminary-us-emissions-estimates-for-2018/>

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<http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=1454161&DocName=2018%20PA%20CLIMATE%20ACTION%20PLAN.PDF%20%20%20%3cspan%20style%3D%22color:blue%3b%22%3e%28NEW%29%3c/span%3e>

have an accurate or complete accounting of methane emissions from natural gas production, delivery, and use. Methane is an even more potent greenhouse gas than carbon dioxide that could offset any gains made from fuel switching from coal. In addition to the steps outlined below, it is imperative that Pennsylvania enact strong regulations that mandate leak detection and repair for natural gas operations and facilities, as well as stronger emission controls.

Climate change isn't just an environmental issue – interests from the U.S. Military⁸ to financial institutions to utilities to energy companies themselves understand what is at stake and the need to decarbonize energy production and our broader economy.

For example, last year Royal Dutch Shell (Shell) released its Sky Scenario,⁹ which seeks to identify pathways to achieve the emission reduction targets of the 2015 Paris Agreement. Shell calls the Paris Agreement a “pragmatic blueprint for resolving one of the toughest issues society faces,” with the Sky Scenario calling for policies that align with those I would like to discuss today.

And in just the past two weeks, collective reports from the Federal Reserve Bank¹⁰ and Goldman Sachs¹¹ detail the drastic economic and societal costs of climate change, and how those costs will be amplified by failure of action.

All this leads us back to the hearing today.

The science and need to act are clear. This means that our energy systems, which have evolved over more than 100 years, need to fully transform over a matter of decades. This is an extremely challenging undertaking, but it can be accomplished if we work together.

Pennsylvania's Pathway

As noted above, PEC has been examining the issue of decarbonization with respect to the electric generation sector. These efforts have included a conference and white paper in 2017,¹² numerous stakeholder discussions on key issues and opportunities, and our January 2019 *Energy and Climate: A Policy Pathway Forward for Pennsylvania* recommendations report (“Energy Pathways report”).¹³

The Energy Pathways report contains two primary recommendations that I'd like to focus on today. These recommendations are based on mechanisms that are proven, in place in neighboring states, generate economic benefits and job growth, advance new technologies and businesses, and achieve

⁸ In a January 2019 Department of Defense report on the impacts of climate change, the Department unequivocally states in the very first line of the report that climate change is a pressing national security issue.

<https://media.defense.gov/2019/Jan/29/2002084200/-1/-1/1/CLIMATE-CHANGE-REPORT-2019.PDF>

⁹ <https://www.shell.com/energy-and-innovation/the-energy-future/scenarios/shell-scenario-sky.html>

¹⁰ <https://www.frbsf.org/community-development/publications/community-development-investment-review/2019/october/strategies-to-address-climate-change-low-moderate-income-communities/>

¹¹ Goldman Sachs, *Taking the Heat*, September 2019. <https://www.goldmansachs.com/insights/pages/gs-research/taking-the-heat/report.pdf>

¹² Pennsylvania Environmental Council, *Achieving Deep Carbon Reductions*, June 2017.

<https://pecpa.org/deepdecarb2017>

¹³ <https://pecpa.org/wp-content/uploads/PEC-Energy-and-Climate-Pathway.pdf>

significant emission reductions. Especially important in Pennsylvania’s unique energy landscape, they allow multiple energy resources – including fossil fuel generation with carbon capture – to be part of the solution.

Recommendation: Develop a state program that links with the Regional Greenhouse Gas Initiative to further emissions reductions and generate revenues.

Our first recommendation is for Pennsylvania to develop a state program that can link with the Regional Greenhouse Gas Initiative (RGGI) – a multi-state, market-driven initiative to reduce carbon emissions in the electric power sector. RGGI is a cooperative platform among the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont to cap and reduce CO₂ emissions from electricity generation. New Jersey will be linked to RGGI next year. Virginia is currently considering its own state program. To be clear: each state develops its own program. The state programs can then link to a mutually designed and consensus-based platform. This is not an intervening compact that requires states to surrender sovereignty.

As a group, RGGI’s current aggregate CO₂ emissions rank in the top 20 among all nations.¹⁴ This comparison does not include emissions from New Jersey, Virginia, and Pennsylvania – states that are either now linking to RGGI or considering doing so. From a climate change standpoint, RGGI is globally significant, and could become even more so.

RGGI works through a regional limit on carbon emissions determined by mutual agreement among the participating states. That emissions limit is then lowered over time. Carbon-emitting power generators with a capacity of 25 megawatts or more are required to purchase allowances equal to their CO₂ emissions. Those allowances are priced based on the results of a regional auction. Regulated power plants can use an allowance issued by any of the participating RGGI states to show compliance. They can also bank allowances for use in future years, or buy and sell allowances in secondary markets.

RGGI does not dictate which plants operate and which ones don’t. It does not pick winners and losers. The program’s design is similar to air pollution control programs that Pennsylvania has already participated in,¹⁵ and aligns with our restructured, competitive market in operation today.

To date, the RGGI program has held 45 quarterly auctions¹⁶ which have been deemed successful in terms of price discovery, transparency, transaction costs, and other logistical considerations.¹⁷ RGGI’s design also includes safeguards such as a cost containment measure (called a “Cost

¹⁴ Congressional Research Service, *The Regional Greenhouse Gas Initiative: Background, Impacts, and Selected Issues*, July 2019. <https://fas.org/sgp/crs/misc/R41836.pdf>

¹⁵ The 1990 Clean Air Act Amendments established a cap-and-trade system to control sulfur dioxide and nitrogen oxides. The program is generally considered a success in terms of emission reductions and program costs (see, e.g., Juha Siikamaki et al., *The U.S. Environmental Protection Agency’s Acid Rain Program*, Resources for the Future, 2012).

¹⁶ <https://www.rggi.org/auctions/auction-results>

¹⁷ See Congressional Research Service, *The Regional Greenhouse Gas Initiative*. See also Paul J. Hibbard et al., “An Expanding Carbon Cap-and-Trade Regime? A Decade of Experience with RGGI Charts a Path Forward,” *The Electricity Journal*, 2018; and M.J. Bradley & Associates, *A Pioneering Approach to Carbon Markets: How the Northeast States Redefined Cap and Trade for the Benefit of Consumers*, 2017.

Containment Reserve”) that provides for release of additional allowances to be sold at auction if certain pre-determined price thresholds are met. This is designed to mitigate against higher-than-expected allowance prices.

With respect to emissions, CO₂ emissions from power plants in RGGI states have fallen by 47%, outpacing the rest of the country by 90%.¹⁸ While RGGI is not the sole factor, it has been a key driver of those reductions.¹⁹

Since RGGI’s launch, almost all of the more than \$3 billion²⁰ in proceeds that have been generated from allowance auctions has gone back to participating states to be used for energy efficiency programs, renewable and distributed energy projects, consumer assistance, job training, and more. In Pennsylvania, in addition to the objectives above, we could utilize these revenues for infrastructure resiliency, investment in carbon capture and utilization technologies, assistance to nuclear generation assets if warranted, and support for communities and workers facing the transition away from coal generation – a transition that will continue to occur regardless of our involvement with RGGI.

Research has shown that linking to RGGI is not an economic inhibitor. In a 2018 peer-reviewed journal article, the Analysis Group calculated that during the first three compliance periods (2009-2017), the RGGI program has yielded a net benefit of \$4.7 billion and more than 40,000 job-years (defined as the equivalent to one full-time job for one year) to participating states.²¹ These numbers do not even account for the public health benefits resulting from reduced air pollution emissions (reductions in CO₂ emissions also provide associated reductions in other criteria pollutants). Between 2008 (before RGGI’s launch) to 2018, RGGI states’ economies grew by 46.9% versus 35.8% in states that do not regulate or put a price on carbon emissions (this does not include California, which has similarly outpaced national growth since implementing its own emissions cap program).²²

With respect to how RGGI could impact electricity prices, research performed by the Acadia Center (utilizing EIA data) has shown that prices in RGGI states have actually fallen by 5.7% - outperforming price levels in non-RGGI states.²³ Modeling performed by researchers at the Kleinman Center for Energy Policy at the University of Pennsylvania has indicated that electricity prices in Pennsylvania could be unaffected or even decrease with our participation in RGGI, depending on use of auction

¹⁸ Acadia Center, *The Regional Greenhouse Gas Initiative – 10 Years in Review*, September 2019.

<https://acadiacenter.org/document/the-regional-greenhouse-gas-initiative-ten-years-in-review/>

¹⁹ Id. See also Brian Murray and Peter Maniloff, *Why Have Greenhouse Emissions in RGGI States Declined? An Econometric Attribution to Economic, Energy Market, and Policy Factors*, Duke Nicholas Institute, August 2015.

<https://nicholasinstitute.duke.edu/environment/publications/why-have-greenhouse-emissions-rggi-states-declined-econometric-attribution-economic>.

²⁰ Id.

²¹ Analysis Group, *The Economic Impacts of the Regional Greenhouse Gas Initiative on Nine Northeast and Mid-Atlantic States*, April 2018.

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

²² Acadia Center, *The Regional Greenhouse Gas Initiative*, which in turn cites a report by the Environmental Defense Fund, *Carbon Market California: A Comprehensive Analysis of the Golden State’s Cap-and-Trade Program*.

²³ Id. Citing Energy Information Administration Form 826. <http://www.eia.gov/electricity/data/eia826>

revenues.²⁴ Analysis performed by Resources for the Future, released just this month, reinforced this finding, showing that retail electricity prices are projected to be less than one half of one percent higher in 2026 relative to a business as usual scenario – and that is working with the assumption that auction revenues are not used for any consumer assistance or efficiency programs.²⁵

Findings on electricity prices in RGGI states, as well as projections for Pennsylvania, are of course dependent on multiple factors including use of allowance auction revenue, the commodity price of fuel sources, and other influences. Without question, utilizing revenue for energy efficiency programs that reduce consumers' bills and overall energy demand will provide both immediate and long-term cost savings, and further reduce emission levels. While it's too early for anyone to definitively declare what RGGI would mean for electricity prices in Pennsylvania, there appears to be significant opportunity to make this a net benefit scenario.

In summary, RGGI is not a foreign concept, even to Pennsylvania. It is thoughtfully designed to allow flexibility in compliance, and to prevent unanticipated price impacts. It has spurred emission reductions while providing for significant economic revenues and consumer benefits in participating states. Careful consideration will be required as to how Pennsylvania designs its program, but the issues to address are not dissimilar to what we have faced in the past, and what other states have encountered in their own program design.

It is achievable and the right step for Pennsylvania to take.

Recommendation: Reform Pennsylvania's Alternative Energy Portfolio Standards into a Clean Energy Standard to be more technology-inclusive and further drive zero-carbon electricity generation in a way that makes sense for Pennsylvania.

Our second recommendation is that Pennsylvania should adopt a Clean Energy Standard that would build on the success of the Alternative Energy Portfolio Standards (AEPS) while also reflecting that we need an "all in" approach to achieve carbon reduction goals. This holds especially true for Pennsylvania.

The AEPS requires energy utilities to purchase a set amount of power from specific generation technologies, some of which provide no carbon reduction benefits at all. What we are proposing is to restructure the AEPS into a Clean Energy Standard (CES). A CES would be centered on emissions-based outcomes (i.e., zero and lower emitting carbon sources), with an overall goal of achieving net zero electricity generation in Pennsylvania by 2050. This will allow existing firm generation assets, as well as new technologies as they develop, to participate.

Firm assets are those that are available on-demand, any time of year. They are, and will continue to be for the foreseeable future, a critical part of our generation mix and a necessary complement to

²⁴ Jose Miguel Abito, *Self-Imposed Emission Limits – Is There a Case for Pennsylvania and RGGI?*, May 2019. <https://kleinmanenergy.upenn.edu/policy-digests/self-imposed-emission-limits>

²⁵ Resources for the Future, *State Policy Options to Price Carbon from Electricity in Pennsylvania*. Issue Brief 19-07, October 2019. https://media.rff.org/documents/IB_19-07.pdf

variable renewables like wind and solar. Firm zero and low-carbon resources include, today, nuclear energy, fossil fuels with carbon capture and storage, hydroelectric power, and some bioenergy. In the future, they could include emerging technologies such as advanced geothermal or hydrogen generated by low or zero carbon fuels.

Without question, we must remain committed to preserving and growing the substantial market investments made by the renewable energy sector in Pennsylvania. The economic and employment benefits²⁶ of clean and renewable energy technologies – ranging from construction to manufacturing to professional services – are vital to Pennsylvania now and will become all the more so in the future. They extend to every corner of the Commonwealth, in both rural and urban areas, and have provided true cost savings to consumers. Any transition to a CES must account for these considerations in its design.

The current framework of the AEPS extends only to 2021, so it makes sense now to consider how we can improve and expand on this model in a way that works for Pennsylvania while also furthering energy and climate goals. The CES approach is being adopted by a growing number of states and works in tandem with carbon reduction commitments being made by major utilities across the country.²⁷

In very broad brushstrokes, a CES for Pennsylvania could potentially be structured as follows:

- A redesigned and expanded “Zero Carbon (aka Tier 1)” market standard that maintains a dedicated allocation for renewables, but also allows for other assets like nuclear generation. As new technologies are developed and deployed – like natural gas generation with carbon capture and sequestration, or energy storage technologies – they too can qualify. In other words, a CES can continue to accommodate new resources. As part of the CES design, this zero carbon market standard or tier would increase over time.
- A completely redesigned “Low Carbon (aka Tier 2)” market standard that includes any generation source that can meet an emissions per MWh threshold.²⁸ Over time, this standard could either become more stringent (i.e. require a lower emissions per MWh threshold), or kept at a same threshold but phased out in conjunction with corresponding increases in the Zero Carbon Standard.
- And, as has been done in other states as well as in the current design of the AEPS, allowance for alternative compliance measures that are verified and quantifiable.

²⁶ See, e.g., the *E2 Clean Jobs Pennsylvania 2019* report. <https://www.e2.org/reports/clean-jobs-pennsylvania-2019/>

²⁷ See the Clean Air Task Force’s *Factsheet State and Utility Climate Change Targets Shift to Carbon Reductions, Technology Diversity*, June 2019. <https://www.catf.us/resource/state-utility-climate-change-targets/>

²⁸ See, for example, Massachusetts, which provides a standard that includes any generation unit that has net lifecycle greenhouse gas emissions 50% lower than those of a new combined cycle natural gas plant (as long as that generation unit was put into operation after 2010). Code of Massachusetts Regulations, 310 CMR 7.75. <https://www.mass.gov/files/documents/2019/01/02/310cmr07.pdf>

The overall goal of the CES would be to achieve a net zero carbon electricity generation portfolio in Pennsylvania on or before 2050. This is an “all in,” technology and generation inclusive approach that works with Pennsylvania’s current realities and future needs while still allowing for competition. There are a considerable amount of issues and details to consider and address, but we believe a CES is a sensible and beneficial approach for Pennsylvania. We would welcome the opportunity to work with the General Assembly on this concept.

Other Recommendations

Beyond the primary recommendations described above, our Energy Pathways report identifies additional opportunities with respect to the transportation sector, carbon capture, distributed renewables and energy storage, community solar, grid modernization, and other options that will further drive emission reductions and energy cost savings. We hope all these options receive due consideration by the General Assembly.

Conclusion

Thank you again for the opportunity to participate in this important discussion today. PEC looks forward to working with you on advancing energy and climate policies for Pennsylvania. I would be happy to answer any questions you may have.