CLIMATE CHANGE ADVISORY COMMITTEE
MEETING MINUTES
October 25, 2022, 9 a.m. – 12 p.m.
Rachel Carson State Office Building,
and via WebEx

MEMBERS/ALTERNATES PRESENT:

Chairperson Steve Krug
Vice-Chairperson Marc Mondor
Greg Czarnecki (for Cindy Dunn)
Joseph Sherrick (for Gladys Brown Dutrieuille)
Adam Walters (for Neil Weaver)
Lindsay Baxter
Flora Cardoni
Elizabeth Marx
Patrick Henderson
Jason Kelso
Kimberly Kipin-McDonald
Terry Bossert
Rep. Perry Stambaugh
Cristy Sweeny (for Jaret Gibbons)
Glendon King (for Rep. Daryl Metcalf)
Rep. Sarah Innamorato
Steve McCarter

MEMBERS ABSENT:

Paul Morris, Christopher Sandvig, Jenny Greenberg

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP) STAFF:

Lindsay Byron, Kerry Campbell, Darek Jagiela, David Althoff, Louie Krak, Daniel Eitzman, Christopher Nafe, Susan Foster, Jennie Demjanick

INVITED GUESTS:

Matt Fry, Rick Bohan, Jim Freihaut

MEMBERS OF THE PUBLIC:

Brian Smiley, Griffin Caruso, Grant Gulibon, Paul Opiyo, Robert Barkanic, Robert Graff, Nate Wardle, Eli Brill, Franklin Egan, Katie Sneeringer, David Gelman, Ethan Story, Nick Kowalski, Robert Routh, Sarah Corcoran, Wendy Merz, Byran Zicherl, Laura Edinger, Melissa Farr

MEETING:

The October 25, 2022, meeting of the Climate Change Advisory Committee (CCAC or Committee) was called to order at 9:00 a.m. by Chairperson Steve Krug. With 15 of 21 seated members present at the start of the meeting, a quorum was established.

MINUTES: The minutes of the August 23, 2022, CCAC meeting were presented to the Committee for approval. A motion to approve the minutes was made by Mr. Henderson and seconded by Mr. King. There were no requests to edit the minutes by any members. The motion to approve the minutes carried by a voice vote and passed.

MEETING SUMMARY: (This narrative provides a summary of the discussions that took place during the meeting. It is not a transcript of the proceedings.)

<u>Matt Fry, Great Plains Institute – Team PA Hydrogen Report</u>

Chairperson Krug introduced Matt Fry, senior policy manager at the Great Plains Institute (GPI), to discuss the Team PA Hydrogen Report. Mr. Fry, on behalf of GPI, provided a roadmap for carbon management and hydrogen project deployment in the commonwealth. Mr. Fry discussed carbon management deployment potential, main issues with hydrogen projects, and next steps Pennsylvania should take to expand regional opportunities. Mr. Fry shared that Pennsylvania has a large potential capacity for carbon dioxide (CO_2) storage, and 50 facilities in Pennyslvania are eligible for 45Q tax credits, while 22 eligible facilities are identified as near-term capture opportunities. Mr. Fry reasoned that there is a regional opportunity, mostly focused in Pennsylvania, for capturing CO_2 emissions.

Mr. Fry informed the Committee that all steps in GPI's roadmap should address environmental justice (EJ) concerns during their respective processes. Mr. Fry presented to the Committee these nine steps Pennsylvania should take to implement carbon management and hydrogen project deployment: 1) update and revise its stationary framework to incorporate full scale deployment; 2)apply for Underground Injection Control Class VI primacy with the Environmental Protection Agency (EPA), allowing Pennsylvania to utilize CO_2 injection infrastructure; 3)consider regional approaches; 4)prepare and apply for Hydrogen Hubs funding; 5)solicit Infrastructure Investments and Jobs Act (IIJA) funding; 6)commission future studies to add additional information to GPI's road map; 7) digitize the state's subsurface data to achieve consistency in curation updates and make the pore space data more user-friendly for project developers; 8)comment and engage with stakeholders on proposed regulatory changes and public policy opportunities; and 9)consider adopting and implementing standards and best practices in the sector and actively consider EJ areas.

DISCUSSION:

Mr. Walters thanked Mr. Fry and GPI for the collaboration of diverse stakeholders interested in industrial sector decarbonization. Mr. Fry responded by stating that the collaboration was formed to address the issues discussed in the presentation. Additionally, Mr. Fry stated that the road map and report were completed transparently and collaboratively with stakeholders, and the collaboration continues to grow. Mr. Walters indicated to the Committee that he hopes this work will be reflected in the next Pennsylvania climate action plan and stated that these technologies represent new paths forward for decarbonization.

Chairman Krug noted that he agreed with Mr. Walters' assessment that decarbonizing industrial sector is one of Pennsylvania's the greatest challenges, and many options, including carbon capture and hydrogen development, must be explored. Ms. Marx stated that she was interested in how EJ factors into the presented report. It was discussed that a link to the full report, which discusses this matter, will be sent to committee members and available to the public.

Rick Bohan, Portland Cement Association – Decarbonizing Cement Manufacturing

Chairman Krug introduced Rick Bohan, who spoke on behalf of the Portland Cement Association (PCA). Mr. Bohan presented on the efforts the cement manufacturing industry is making to reach carbon neutrality by 2050. Mr. Bohan informed the Committee that PCA's full decarbonization road map is located on their website. Mr. Bohan stated that by law, the cement industry must report their greenhouse gas (GHG) emissions to the EPA, making them one of the most regulated industries in the industrial sector. Mr. Bohan stated that the cement industry produces GHG emissions through two main sources, calcination to produce clinker and combustion needed to produce extreme levels of heat to drive the calcination reaction. The ratio of GHG production in this process is 40% from calcination and 60% from combustion. Mr. Bohan stated that carbon neutrality should be achieved throughout their value chain, not just at the cement plant. Mr. Bohan raised the example of concrete itself acting as a carbon sink, stating that 10% of the CO_2 emitted by the production and transportation of concrete is absorbed by the concrete

itself over its lifecycle. Mr. Bohan explained that actions the industry is taking at cement plants include increasing the use of decarbonated raw material, decreasing the use of traditional fossil fuels and increasing the use of alternative fuels, pushing energy efficiency and decreasing intensity, utilizing carbon capture to avoid release of CO_2 emissions, and reducing clinker production emissions.

Mr. Bohan stated by 2050, the cement industry wants to use mostly alternative fuels and stated that current prescriptive-based specifications are restricting the industry's decarbonization efforts. Instead, the sector should institute performance-based specifications. Additionally, Mr. Bohan discussed design teams that are concentrating on embodied carbon in concrete construction provide a short-sighted approach to carbon reduction. They should favor structures lasting 50 years instead of ten to decrease emissions. Mr. Bohan concluded his presentation with ten policies that Pennsylvania should implement in the cement manufacturing sector: 1) research, development, and innovation; 2) regulations, permitting, and guidance; 3) financial incentives and support; 4) performance-based material standards; 5) market-based carbon pricing; 6) market acceptance; 7) community acceptance; 8) life cycle-based procurement; 9) low-carbon infrastructure; and 10) level playing field.

DISCUSSION:

Chairman Krug asked Mr. Bohan what "petcoke" was, and Mr. Bohan explained that it was the "dregs" of petroleum that get processed into a fuel with a higher heat content than coal.

Petroleum coke can be used as a supplementary fuel in the cement industry.

Chairman Krug also expressed excitement about the low carbon concrete being discussed in the industry and the use of performance-based specifications. Mr. Bohan added that Portland Cement Association submitted comments about the low carbon concrete specifications.

Mr. Bohan stated that biomass may be part of the solution but is not the entire solution. Additionally, the cement industry does not take an "either-or" approach to fuel use. Mr. Bohan also mentioned that it is not possible to electrify some of the processes required to produce concrete, as electric processes cannot reach the same high temperatures.

Mr. Caruso asked if aerating concrete (aircrete) is a possible means to reduce CO_2 and the amount of concrete needed for a project. Mr. Bohan responded that the process of aerating concrete lowers its compressive strength.

Mr. Sherrick stated there has been a lot of research on the calcium carbonate process. He stated that PennDOT is a large consumer of concrete and is interested their thoughts on these current discussions. Mr. Bohan responded that states still have a real problem with institutional inertia. Chairman Krug commented that cities may be contributing to this inertia, and states follow suit. Mr. Bohan emphasized the desirability of switching from prescriptive to performance-based material standards.

Mr. Krak stated that the federal government purchases massive amounts of building material and asked if PCA is participating in federal and state Buy Clean Initiatives. Mr. Bohan responded that the current specifications for concrete regulation and production vary across the federal government and between states, and the federal government needs more uniformity. Mr. Bohan stated that the concrete industry will reach carbon neutrality by 2050 and can do so faster with policy support.

PUBLIC COMMENT: No public comments were presented at this meeting.

Jim Freihaut, PSU – Combined Heat and Power

Chairman Krug introduced Dr. Jim Freihaut, Professor of Architectural Engineering with Penn State University, who presented on the emerging roles of combined heat and power-anchored distributed energy resources, including decarbonization, energy resiliency and food resiliency and equity. Mr. Freihaut discussed that the drivers for evolution of the United States' energy infrastructure include decarbonization/electrification, resilience/safety, and economic stability.

Dr. Freihaut stated that achieving a net-zero carbon future will require a historic transformation that comes with unique challenges. The U.S. energy infrastructure decarbonization and electrification movement has a top down approach (centralized generation, transmission, and distribution) and a bottom up approach (distributed generation, transmission, and distribution). Dr. Freihaut concluded the actors should do both. The centralized grid approach with top down decarbonization can achieve sustainability goals through biomass, solar power, nuclear power, wind power and hydroelectric power generation, but the central grid does not address resiliency vulnerability risks. Dr. Freihaut's suggested dividing the centralized grid into dispersed microgrids and ensure these systems can operate independently and help recover the centralized grid during an outage.

Dr. Freihaut insisted that combined heat and power (CHP) is a critical element in microgrids. He explained that CHP uses a single device that produces electricity and heat simultaneously. It can be an integrated system located at or near a building, facility, or entire community that provides at least a portion of the electrical load while also utilizing thermal energy. The advantages of CHP are that it gives local resiliency and high use of primary energy while providing a net-zero carbon energy source that is essential for microgrids. Dr. Freihaut discussed the scalability of different types of CHP engines. He stated that an advantage of CHP is that it displaces marginal grid generation, which is currently a mix of coal and natural gas in most U.S. regions. Additionally, Dr. Freihaut proposed that CHP's efficiency advantages will continue to increase as the natural gas infrastructure decarbonizes.

Dr. Freihaut moved on to discuss the operating economics of CHP. He stated that CHP is already economically feasible in many areas. There is a higher upfront cost but lower operating cost and lower emissions resulting in significant annual capital savings. Dr. Freihaut stated that if CHP is incentivized by the right regulations and policies, the technology can greatly benefit the grid. Therefore, policies and regulations must change to favor the adoption of more CHP. He continued by noting that the Inflation Reduction Act (IRA) envisions utilizing CHP to achieve net-zero carbon emissions and achieve grid resiliency while helping historical disadvantaged communities.

Dr. Freihaut concluded his discussion by highlighting that CHP can contribute to food resiliency and equity. He stated that applying a CHP system to a large agricultural greenhouse can have many benefits. Controlled Environment Agriculture (CEA) can produce a yield up to 15 times greater than outdoor, open field farms. Mr. Freihaut also said that Pennsylvania's rural electric co-ops represent could potentially benefit from CHP-produced electricity programs. Rural electric co-ops and municipal grids are great candidates for this because they already have the infrastructure needed to maintain a microgrid. CHP-enabled CEA is not only possible in Pennsylvania but also a advantagous because of the commonwealth's interstate highway system enables producers to ship crops from their farms to east coast markets in one day.

DISCUSSION:

Mr. McCarter asked where specifically hydrogen and natural gas distributive systems are being used extensively and whether they are they used community-wide in the U.S. or internationally. Dr. Freihaut responded by explaining that Europe is blending hydrogen with natural gas to operate CHP systems but is not yet doing so at the community level. Dr. Freihaut continued by stating that some companies in

Europe have been able to pump cleaned exhaust CO_2 from CHP engines onto crop fields to increase growth factors.

Mr. McCarter asked what the current major market for CHP is. Dr. Freihaut explained that the industrial sector, critical infrastructure like medical centers, hotels, and even communities that want to build resilient microgrids are all engaged in the CHP market, with 75% of the market concentrated in the industrial sector. Additionally, the IRA will soon fund CHP technologies , which will further open these markets.

Chairman Krug stated that investors are always concerned about what their future return on investment when purchasing these systems. Dr. Freihaut responded by stating that it is very easy to transition CHP systems to renewable fuels like hydrogen or a mixture of hydrogen and natural gas. Additionally, engine investments can be transitioned to different fuel sources. Chairman Krug added that CHP offers Pennsylvania the ability to use their infrastructure and resources in the future.

Ms. Marx asked if in a small microgrid system like Quakertown's, major industrial customers coming of the grid negatively impact the cost to other customers who are outside the new system. Additionally, she asked if there are any models that currently use CHP with distributed generation. Dr. Freihaut explained that the IRA incentivizes community-based generation systems at a higher rate than non-community-based systems. Additionally, in Quakertown, energy was being exported from the microgrid at the same rate at which ratepayers had historically purchased energy from a third party. Therefore, the borough's resiliency increased, and there were no cost increases to ratepayers.

Mr. Smiley stated that it appears additional community solar will help with distributed energy initiatives, and the state of Delaware allows community solar. He asked if Dr. Freihaut was aware of the current obstacles to community solar in Pennsylvania. Mr. Freihaut explained that community solar is on their policy radar and will most likely need to be supplemented with CHP to deliver the promised benefits.

DEP UPDATES:

Lindsay Byron, on behalf of DEP, discussed several of the agency's recent climate change outreach efforts. On June 23, 2022, DEP participated in a presentation and discussion that the Federal Emergency Management Agency (FEMA) Region 3 Regional Interagency Steering Committee/Regional Advisory Council (RISC/RAC) led on climate adaptation and risks; On July 6, 2022, DEP participated in a discussion with the state of Delaware on the development of local climate action plans (LCAP). Delaware is also interested in developing an LCAP program. On October 2, 2022, DEP state representatives and EPO staff shared information on ongoing sustainability initiatives at the GreenGov Council's PA Sustainability Summit. On October 21, 2022, DEP helped to develop content and webinars for local governments to implement their local climate action plans and sustainability goals at CONNECT x PA Activator Series: State and Regional Sustainability Opportunities for Municipalities – Transportation. On October 24, 2022, DEP promoted DEP's climate action program to local governments at the International Climate Symposium held at Dickinson College.

Next Meeting

Ms. Byron noted the next meeting will happen on December 13 and will focus on climate adaptation efforts. She invited the committee's suggestions for speakers

Adjournment

A motion to adjourn was made by Mr. Gibbons and seconded by Mr. Sherrick. The motion carried, and the meeting was adjourned at 11:43 a.m.