Prepared Testimony of

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Good morning Chairman Wentling, Vice-Chair Committa, and members of the Joint Legislative Conservation Committee. I am Gladys Brown Dutrieuille, Chairman of the Public Utility Commission (Commission or PUC).

The Commission thanks you for this opportunity to present testimony on the Commonwealth's cogeneration industry. With this testimony, I will convey a background on cogeneration in Pennsylvania, summarize actions taken by the Commission related to cogeneration, and provide some insight on how the cogeneration sector may interact with any prospective cap-and-trade program for greenhouse gases.

The United States Department of Energy's (DOE's) Office of Energy Efficiency and Renewable Energy defines cogeneration, also known as combined heat and power (CHP), as the concurrent production of electricity or mechanical power and useful thermal energy from a single source of energy. Further elaborating what CHP entails, the American Council for an Energy-Efficient Economy (ACEEE) states that CHP is not a technology, but an approach to applying technologies intending to harness increased efficiencies through integration of systems.

What is apparent when reading these definitions is the relatively broad range of resources cogeneration or CHP can cover. Some common examples of these resources include the recovering of residual exhaust from a combustion turbine or a steam turbine to heat or cool water. Other types of cogeneration or CHP include microturbines, reciprocating engines, fuel cells, and bottoming cycle systems. The increased efficiencies offered by CHP and cogeneration manifest benefits including decreased emissions and improved end-use economics. Further, the distributed nature of some CHP applications offers the prospect of increased energy grid resiliency and future avoided infrastructure costs.

CHP is often utilized in industrial processes resulting in a broad distribution of these technological applications amongst many end-use utility customers. As these industrial end-users are often customers of PUC regulated electric distribution companies (EDCs) and natural gas distribution companies (NGDCs), the Commission's jurisdiction over EDC and NGDC rates, interconnection requirements, and energy efficiency programs have direct and indirect relations to the CHP industry. The United States Environmental Protection Agency (EPA) estimates there are over 4,400 CHP facilities nationwide. These facilities include but are not limited to hotels, nursing homes, universities, hospitals, prisons, refineries, chemical manufacturers, and wastewater treatment plants. The DOE maintains a database of CHP installation facilities throughout the country. The DOE database lists 166 end-

user sites in the Commonwealth with an overall electric generation capacity of 2,729 megawatts (MWs). This aggregate installed capacity is roughly equivalent to that of Peach Bottom Nuclear Generating Station in York County.

The proliferation of natural gas supply has manifested changes in the CHP marketplace such as, increased development and investment in natural gas fueled reciprocating engines for distributed CHP systems. As distributed systems, these CHP resources can range from as small as 50 kilowatts (kWs) to as large as 10 MWs. According to the DOE, there are approximately 2,400 reciprocating engine CHP units in the country. Also, according to DOE, Pennsylvania has 86 reciprocating engine CHP sites. This represents the largest single CHP resource technology type, from a site number perspective, in the state.

Additionally, the centralized wholesale electricity marketplace has witnessed a similar proliferation of investment and buildout of natural gas fueled combined cycle combustion turbines, or, combined cycle gas turbines (CCGTs). This technology harnesses the waste heat of a gas turbine to power an integrated steam turbine, thereby increasing efficiency of the overall system. While these applications are not considered cogeneration or CHP, they are based on similar engineering goals of increased efficiencies. CCGTs differ in the fact that they are largely not utilized by end-use utility customers for dual purposes, but rather, the technology is harnessed for the single purpose of electricity generation. This technology is transforming the wholesale electric market landscape by supplanting capacity of other traditional resources such as coal and nuclear. In fact, in 2018 CCGTs surpassed coal-fired plants as the technology with the most electricity generating capacity in the United States.

According to the Federal Energy Information Administration (EIA), Pennsylvania has over 8,700 MWs of CCGT installed capacity. When compared with the PJM Interconnection figures for total natural gas installed capacity in the Commonwealth, which was just over 15,000 MWs as of the end of 2018, CCGTs represented approximately half of this total. Further, when compared with the total aggregate installed capacity in the Commonwealth, which was over 44,000 MWs as of the end of 2018, CCGTs represented approximately a 20% share. This increased investment trend appears on track to continue, as the vast majority of prospective new-builds for electric generation in the Commonwealth are CCGTs.

Given the myriad of benefits offered by CHP and cogeneration, the Commission recently issued a policy statement seeking to advance the development of distributed

CHP in the Commonwealth.[1] The policy statement aims to achieve this development through several means.

First, the Commission encourages utilities to make CHP an integral part of their energy efficiency programs. Since CHP offers a more efficient method for the generation and consumption of energy, such resources can fit squarely into a portfolio of measures offered by EDCs under Act 129 energy efficiency programs.[2] In 2013 the Commission released a study which detailed the amount of cost-effective CHP achievable within the commercial and industrial sectors of Act 129 programs.[3] The study concluded an achievable number of 58.7 MWs. In this same vein, several projects have already been supported by Act 129 funds. An example of this is Geisinger's Danville Hospital cogeneration project. The project, costing $5.3 million in total, utilized $500,000 in Act 129 funds, and now is estimated to save the hospital over $2 million annually.

As well, the design of distribution rates for electricity end-users is a key element in analyzing the cost-effectiveness of distributed energy CHP investments. One of the often-contentious components in electricity rate case proceedings is standby rates. These are the components of rates that customers with behind-the-meter generation pay to ensure the utility has enough capacity to serve load in the event a CHP unit does not generate power. The Commission has encouraged utilities to design rates which are fair and accommodative to such resources. We have also encouraged utilities to consider the design of dedicated rates for customers using CHP.

The Commission created a biennial reporting requirement for electric and natural gas utilities in order to better understand the status of the distributed CHP marketplace within the Commonwealth. In March of 2019, the Commission released its first report pursuant to this requirement.[4] Of highlight, the report states that the CHP sites detailed therein produce electricity equivalent to powering approximately 240,000 homes annually. Further, the report estimates that the additional electricity produced by prospective additions of CHP in the Commonwealth could power the equivalent of an additional 41,000 homes.

Moving on, the Commonwealth's Alternative Energy Portfolio Standards (AEPS) Act also supports cogeneration.[5] The Commission monitors EDC and electric

[1] 'Final Policy Statement on Combined Heat and Power' issued April 5, 2018 at Docket M-2016-2530484
[2] Act 129 of 2008 – House Bill 2200.
[3] 'Distributed Generation Potential Study for Pennsylvania' released March 2015.
[4] 'CHP Biennial Report – 2019' issued March 28, 2019.
[5] Alternative Energy Portfolio Standards Act of 2004 – Act 213.

generation supplier (EGS) compliance with AEPS mandates. In summary, AEPS requires EDCs and EGSs to source a certain percentage of electricity from alternative resources, which includes demand side management technologies like CHP as a Tier II resource. Of highlight, and what may be specifically of interest to this Committee, is the use of waste coal to generate electricity. The Tier II resource classification under the AEPS also includes waste coal. In the 2019 energy year, or the twelve months ending May 31, 2019, Tier II AEPS credits sold for an average of $0.31 per MWh. Further, the overall cost of all Pennsylvania waste coal generator retired Tier II credits for that same period was $1.47 million.

Waste coal is a form of generation which burns the residual coal that often contains rock and other debris left in piles scattered throughout Pennsylvania's anthracite and bituminous coal regions. These facilities utilize circulating fluidized bed combustion boilers, a technology which aids in the combustion of a variety of alternative fuels. The fleet of waste coal plants has provided environmental benefits by clearing areas of waste coal piles, in turn helping to improve the water quality of area streams. In addition, some of these waste coal plants are cogeneration plants and provide useful thermal energy to facilities. An example of this is the Ebensburg Power Company whose steam heat supplies heating to Ebensburg Center, a licensed intermediate care facility that provides support to people with intellectual disabilities. Reclamation of these sites brings an end to the run-off of iron and heavy metals that for decades have been leaching from the bare rock and minerals lying on the surface. However, given the low heat content of the coal, which potentially is the reason for it not being used for electric generation in the first place, the application of waste coal for electricity can still result in relatively high pollution emissions rates when compared with traditional coal combustion or CCGTs. To no surprise, the Commonwealth, with its storied coal history, has the largest number of waste coal electric generation facilities in the country. At present, Pennsylvania has a dozen waste coal plants with an average capacity of approximately 124 MWs per plant and a total capacity of 1,494 MWs.

As you can see, Pennsylvania has a wide-ranging landscape of cogeneration and CHP as well as a flourishing related market in the wholesale CCGT arena. Understanding this, it is logical to ask how this landscape may be affected by the Governor's Executive Order directing the Department of Environmental Protection (DEP) to initiate a rulemaking to join the Regional Greenhouse Gas Initiative (RGGI). The Commission first wishes to note that it is not here to advocate for or against the Commonwealth's pursuit to join RGGI. As an economic, safety, and quality of service regulator; and not an environmental regulator, we intend to facilitate the objective

conveyance of any data, information, or insight which may be sought by DEP, the Legislature, and the Governor as the RGGI rulemaking proceeds.

With that understanding, the Commission posits that there appears to be three important components of analysis when attempting to determine the effect, if any, joining RGGI will have on the cogeneration/CHP and the CCGT marketplace in Pennsylvania. These are the exemption characteristics for resource participation, the aggregate carbon emissions cap, and the use of funds manifested from RGGI carbon allowances. For the purposes of objectivity, using the RGGI model rule is likely the best starting point. The model rule is a default design which states can use as a starting point when considering entrance to the compact, and, a basis for which states may revise their individual criterion to suit their own unique needs and policy goals.

The model rule sets an exemption for any resource with a capacity of 25 MWs or less. Under this design, the vast majority of distributed behind-the-meter CHP and cogeneration units would not be subject to the RGGI model rule (i.e. exempted). Conversely, essentially all of the centralized electric generation units utilizing CCGTs and all waste coal facilities, along with a small number of large distributed CHP units, would be subject to the model rule. To that end, these facilities would likely realize an increased cost necessary for compliance with the RGGI carbon allowance cap. While the blanket 25 MW exemption is part of the model rule, a state may design different exemptions. Any such design may have a material effect on the cogeneration landscape, depending exactly on how it increases or decreases resource participation in the RGGI market.

The degree of cost for resources included in RGGI, on a per unit basis such as MWh, is a direct result of the carbon intensity of the resource and the RGGI carbon allowance cap. Utilizing data from RGGI and the EPA shows that the increased cost of operations for CCGTs in Pennsylvania would have been approximately $2 to $3 per MWh in 2019.[6] In comparison, the average locational marginal price in PJM during the first three quarters of 2018 and 2019 was $39.43 and $27.60 per MWh respectively. At this time, the Commission is not able to comment on any ramifications increased costs may have on applicable cogeneration resources, we are only able to acknowledge their existence.

Lastly, the utilization of proceeds from RGGI allowance auctions is an important variable to consider. The RGGI design only mandates that 25% of the state proceeds be used for consumer benefits or strategic energy purposes. Therefore, the

[6] This approximation applies 2019 RGGI clearing prices to Pennsylvania CCGT emissions and production. Information obtained via the EPA's Air Markets Program Data - https://ampd.epa.gov/ampd/ and RGGI - https://www.rggi.org/auctions/auction-results.

state has design optionality for the remaining 75% of proceeds. To that end, states may support CHP or cogeneration with said funds. In such a case, any effects on these resources which are the result of RGGI market participation may be minimized through the allocation of RGGI revenues.[7]

In closing, it is our hope that this testimony helps facilitate a better understanding of cogeneration/CHP and CCGTs in Pennsylvania. We emphasize our role as economic, safety, and quality of service regulators; and how this role does not cover environmental regulation. Nonetheless, we are fully cognizant of the nexus that environmental regulations have with the Commission's jurisdiction. We hope that this testimony has helped frame a better understanding of this interaction as well as the Commission's jurisdiction in the cogeneration marketplace. The Commission is happy to work with this Committee, the General Assembly as a whole, and the Governor's Office to facilitate any further analysis or considerations related to the Commonwealth's cogeneration landscape.

[7] The Commission wishes to note the Federal Energy Regulatory Commission's December 19, 2019 decision on PJM's Capacity Market design at Docket No. EL16-49-000. This decision may have impacts on the operations of cogeneration resources in the Commonwealth. The Commission is still reviewing this decision as of the date of submission of the testimony herein.