

# **CHP BIENNIAL REPORT**

## **2021**



### **Technical Utility Services**

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## Executive Summary

This report has been prepared to provide a picture of the amount and types of combined heat and power (CHP) systems that exist or are in some stage of development in Pennsylvania and represents the deployment of CHP from July 2018 to June 2020. The information contained herein is given in a manner that does not compromise the confidentiality of CHP owners, while also providing a useful snapshot of the state of CHP deployment. This report does not speculate on the long-term prospects of CHP deployment, nor is it intended to praise or shame electric and natural gas distribution companies for the relative capacities or the amount of CHP systems in their respective service territories.

The deployment of CHP relies on many factors, principally driven by the customers' valuation to invest in owning and operating such a system. Two of the primary considerations include the value of energy resiliency and a project's rate of return, including aspects such as the cost of installation versus reducing overall electricity and heating costs, payback period of the cost of installation, and/or whether the capital expenditure could better be utilized elsewhere. Understanding this is particularly important in this cycle of reporting because of the impact of the COVID-19 pandemic. Nearly all types of industry that may benefit from the installation of a CHP system have been affected, to some degree, by the pandemic. This includes the ability of onsite engineering work, supply chain issues and the economic impacts. While in some cases of CHP development, the project would continue since capital expenditures have already been allocated, there is anecdotal evidence that projects, particularly in their early stages, have been postponed or cancelled because of the pandemic.

Overall, there are 18 more reported, interconnected CHP systems than were reported in the 2019 CHP Biennial report. Though 13 of these additions reflect projects that were reported as Potential in the 2019 CHP Biennial Report, there were a number of projects that that were not listed as Potential in that report. This is not to fault the electric distribution companies (EDCs) or natural gas distribution companies (NGDCs) for not reporting them previously – indeed, it demonstrates diligence by the EDCs and NGDCs for capturing these systems that were previously unreported. Also, four previously reported interconnected systems have since been disconnected.

## Introduction and Background

CHP is a well understood suite of technologies. The first power plant in the United States, the Pearl Street Station, began operation on Sept. 4, 1882. It also was the first CHP plant because the thermal byproduct of the steam engines was used to provide steam to local manufacturers and warming nearby

buildings on the same Manhattan block.<sup>1</sup> While CHP has been around for over 100 years, it continues to evolve. This evolution includes the use of different fuels, like biogas or hydrogen, to advances in engine design, like combustion turbines and fuel cells. The key to any successful CHP project is whether it will meet the owner's needs and budget.

In the spring and fall of 2014 the Commission held *En Banc* hearings on CHP at Drexel University and the University of Pittsburgh, respectively.<sup>2</sup> Witnesses representing a cross section of the community interested in CHP testified at the hearings, including consultants, electric and natural gas distribution companies, universities, and CHP system owners and advocates. These hearings reinforced the Commission's understanding that a coordinated approach to CHP can provide real benefits to the economy, the environment, and the security of residents and businesses within the Commonwealth.

On Feb. 25, 2016, the Commission adopted a Proposed Policy Statement in support of CHP, to encourage companies to share progress they have made with CHP development, and to help the Commission determine how to best continue the advancement of CHP.<sup>3</sup> Numerous stakeholders provided a variety of comments regarding policy issues and the proposed biennial reporting requirements.

On April 5, 2018, the Commission issued its Final Policy Statement.<sup>4</sup> In doing so, the Commission sought to catalog known, existing and proposed CHP systems.<sup>5</sup> The Commission further sought to understand 1) if and how the EDCs and NGDCs encourage and/or extol the benefits of CHP, via marketing, to potential clients and, 2) if, via the establishment of a CHP Working Group process, the Commission may be able to better facilitate the deployment of CHP technology within the Commonwealth. Finally, the Final Policy Statement requires the Bureau of Technical Utility Services (TUS) to produce a report based on the findings of the biennial report filings and any timely outcomes from the CHP Working Group meetings.

The first CHP Working Group meeting was held on May 30, 2018, in Harrisburg in the Keystone Building. The main topics of discussion were clarifications to the biennial reporting requirements, clarifications of interconnection jurisdiction and costs, information on CHP financing and project support, issues and questions regarding standby rates, and an overview of alternative ratemaking. The second

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<sup>1</sup> See [Northwest CHP Technical Assistance Partnership > About Clean Energy > Combined Heat and Power \(CHP\) > History of CHP \(northwestchptap.org\)](#).

<sup>2</sup> See [http://www.puc.state.pa.us/utility\\_industry/natural\\_gas/chp\\_cogeneration.aspx](http://www.puc.state.pa.us/utility_industry/natural_gas/chp_cogeneration.aspx) under "Combined Heat and Power (CHP) En Banc Hearing – May 5, 2014" and "Combined Heat and Power (CHP) En Banc Hearing – October 7, 2014".

<sup>3</sup> See [Proposed Policy Statement](#) at <http://www.puc.pa.gov/pcdocs/1422142.doc>

<sup>4</sup> See [Final Policy Statement](#) at <http://www.puc.pa.gov/pcdocs/1560599.doc>

<sup>5</sup> See [http://www.puc.state.pa.us/Electric/xls/CHPWG/CHP\\_Report\\_Form.xlsx](http://www.puc.state.pa.us/Electric/xls/CHPWG/CHP_Report_Form.xlsx) for the form used by the utilities to report their CHP information.

Working Group meeting was held on July 16, 2018, in the Keystone Building in Harrisburg. The sole focus of this subsequent meeting was standby rates, because of the significant interest and discussion on the topic during the prior meeting. Additionally, presentations were provided by the U.S. Department of Energy's (DOE) Combined Heat and Power Technical Assistance Partnership regarding a relevant, DOE-commissioned study on standby rates, and by PECO regarding a new standby rate rider. The last Working Group meeting was held on April 16, 2019, in the Keystone Building in Harrisburg. The purpose of this meeting was to present and discuss the findings of the first CHP Biennial Report, discuss the upcoming CHP Market Potential Assessment,<sup>6</sup> and the Standby/Capacity Reservation charges best practices.<sup>7</sup>

## Biennial Report Information

It is fair to assume that the initial CHP Biennial Report involved greater effort on the part of the EDCs and NGDCs to gather the required information as to the amount, sizes, and types of CHP systems within their respective service territories. Since the installation of a CHP system involves a great deal of planning and financial considerations, and by its very nature, is a capital expenditure with a long service life, many of the CHP systems identified in this reporting cycle were also identified in the first biennial report. This is not to say that no new information was provided – several EDCs and NGDCs provided information on potential and disconnected systems and some provided information on CHP units that were previously unreported. In addition, one NGDC, Philadelphia Gas Works (PGW), provided better clarity into estimated costs associated with the increase of natural gas use in CHP units in their service territory.

While much of the information provided in this second biennial report was reported in the first biennial report, some information required research and verification by TUS staff, mainly through web-scraping exercises. Aside from this, information submitted was accepted as received.

As with the previous CHP Biennial Report, it is important to note that the reporting effort does not constitute a complete list of all CHP systems for a variety of reasons, including systems existing within the jurisdiction of municipal authorities and rural electric cooperatives, and poorly understood systems, such as systems operating on biogas or municipal waste. This is the primary reason why there is a difference in the number of CHP systems reported here compared to the U.S. DOE's CHP Installation Database. Some information may have required different levels of data collection and outreach by the utilities and was

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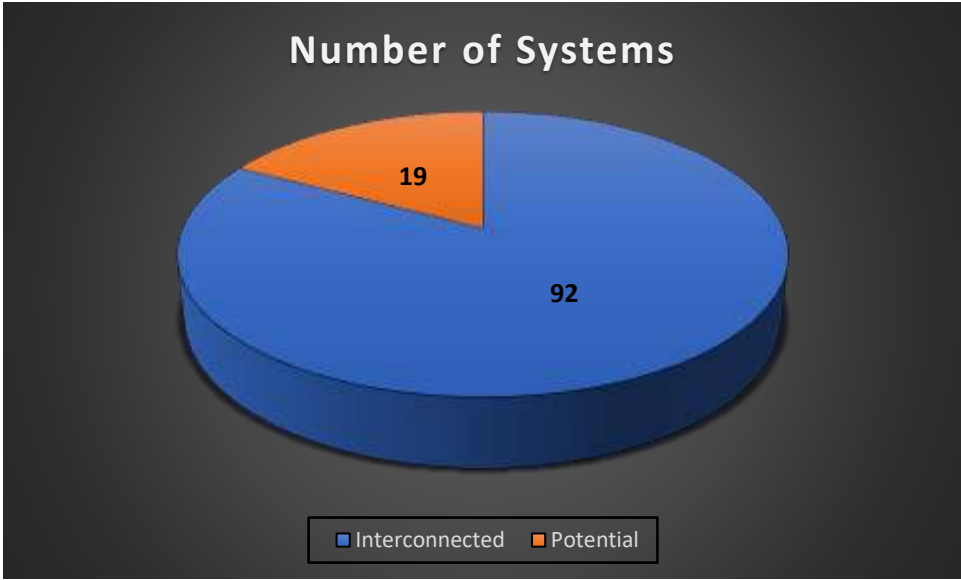
<sup>6</sup> The CHP Market Potential Assessment was conducted by the SWE as a part of the larger [Pennsylvania Act 129 Phase IV Energy Efficiency and Peak Demand Reduction Market Potential Study](#). The purpose of the study is to determine the potential for energy efficiency and peak demand reductions available in Pennsylvania. See <https://www.puc.pa.gov/pcdocs/1656474.pdf>.

<sup>7</sup> See [https://www.puc.pa.gov/Electric/pdf/CHPWG/CHP\\_Standby\\_Capacity\\_Reservation\\_Charge041619.pdf](https://www.puc.pa.gov/Electric/pdf/CHPWG/CHP_Standby_Capacity_Reservation_Charge041619.pdf) for the information presented on Standby/Reservation charges.

dependent upon the CHP system owner to provide the requested information. Because of that, some information was not obtainable, available, or known. Furthermore, the reporting of potential<sup>8</sup> CHP systems should not be viewed as an assessment of CHP potential within the Commonwealth.

Figures 1 and 2 show the number of interconnected and potential CHP systems and the nameplate capacity of those systems, respectively.

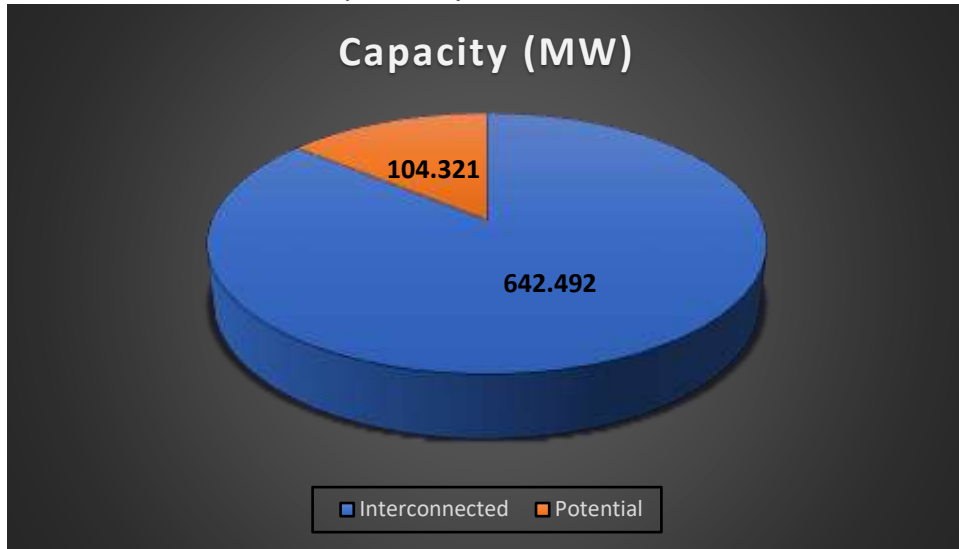
*Figure 1. Number of Interconnected and Potential CHP systems, as Reported by EDCs and NGDCs*



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<sup>8</sup> In the context of this report, “potential” means any CHP system that is not yet fully operational. These could be CHP systems that are in various phases of construction or could mean that the EDC or NGDC has had some level of conversation with a customer about the possibility of installing a CHP system. The EDCs and NGDCs had discretion as to what they deemed a potential system.

Figure 2. Nameplate Capacity of Interconnected and Potential CHP Systems, as Reported by EDCs and NGDCs



Figures 3 and 4 show the number of CHP systems based on nameplate capacity for interconnected and potential systems, respectively.

Figure 3. Number of Interconnected CHP Systems Based on Nameplate Capacity

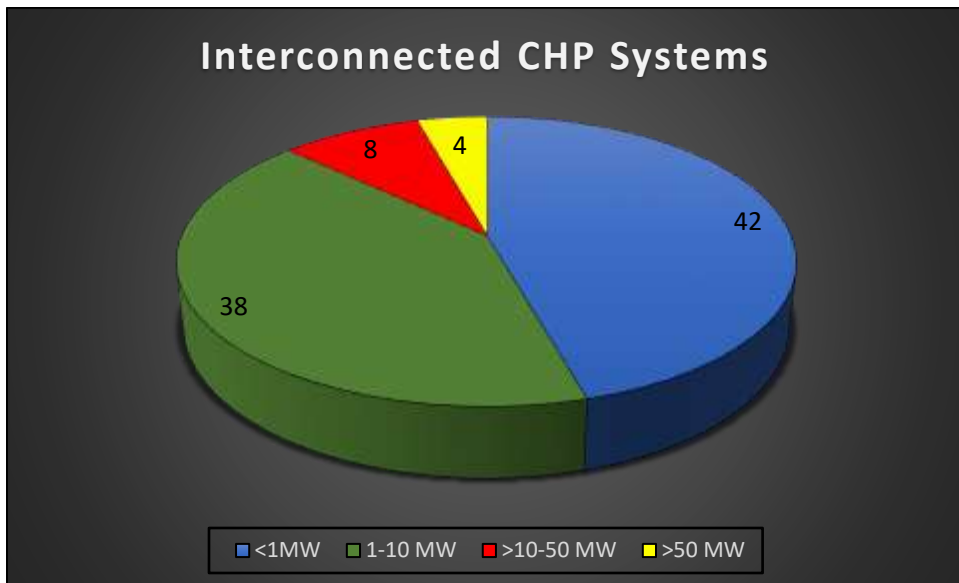
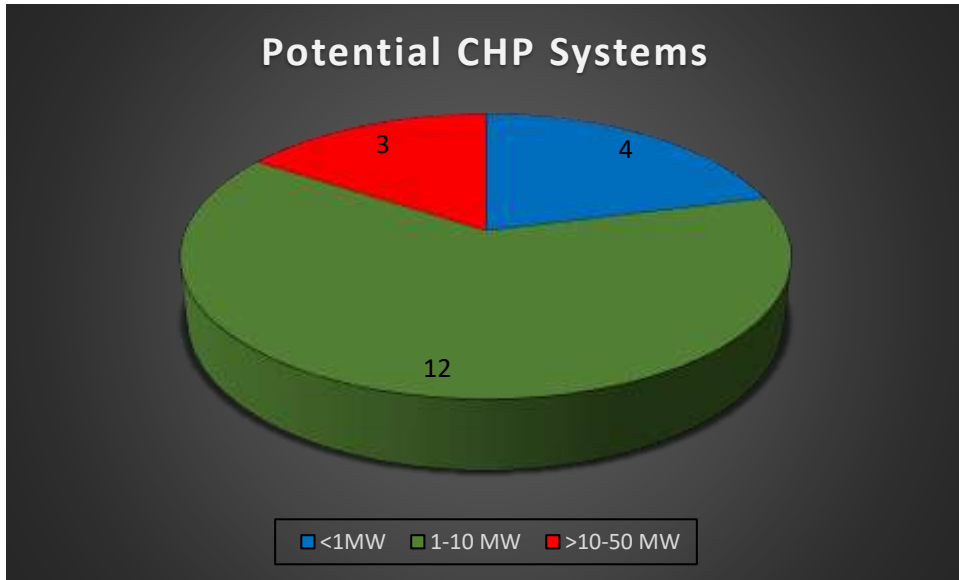


Figure 2. Number of Potential CHP Systems Based on Nameplate Capacity



Figures 5 and 6 give a breakdown of the interconnected CHP systems, by EDC. Figure 5 shows the number of interconnected CHP systems by EDC. Figure 6 shows each EDC's percent of the total nameplate capacity (MW) reported.

Figure 5. Number of Interconnected CHP Systems by EDC

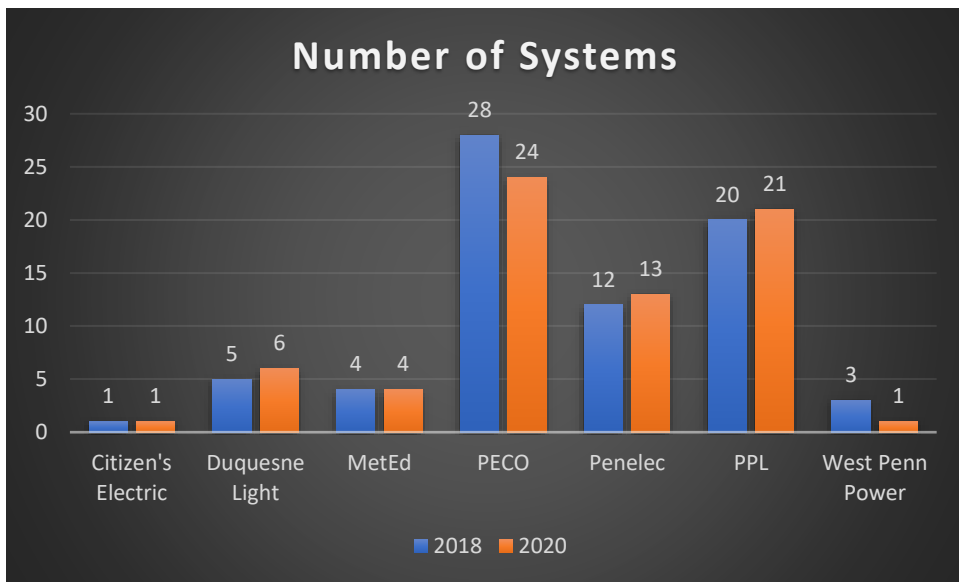
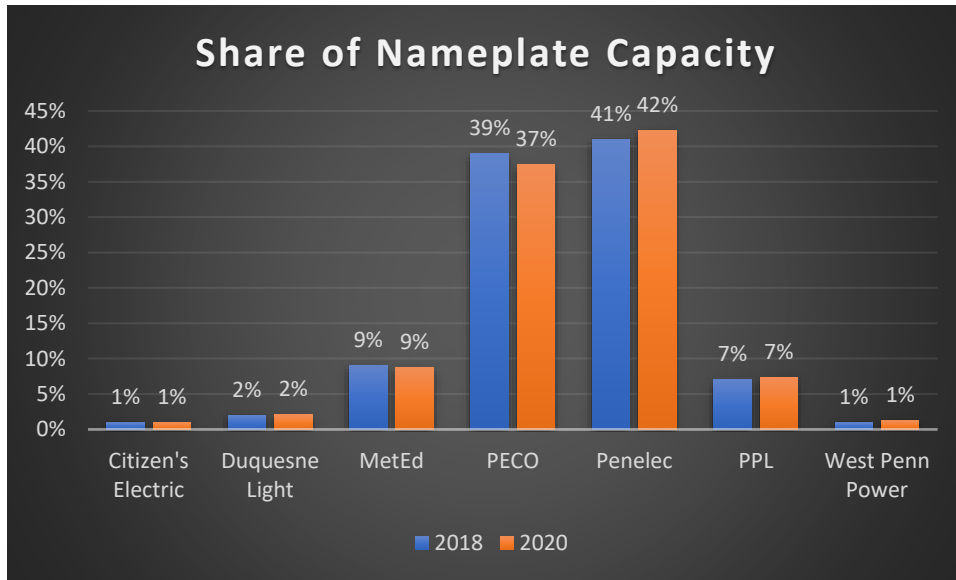


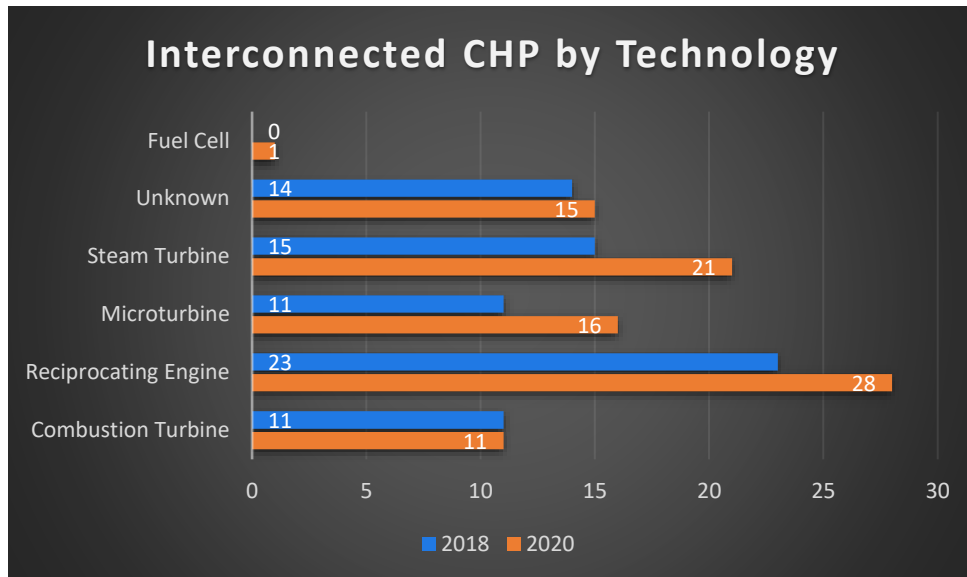


Figure 6. Percent Share of MW of Interconnected CHP Systems by EDC



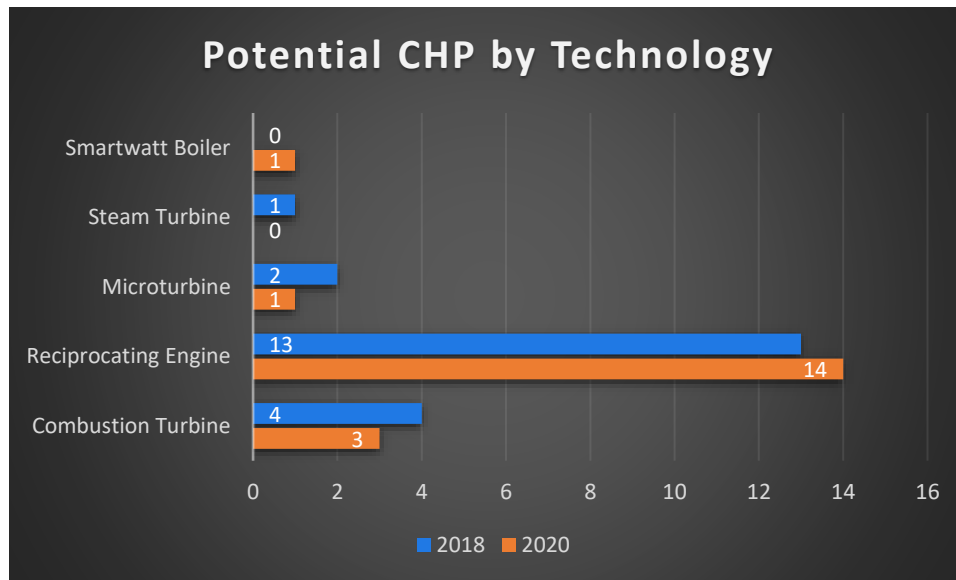
Figures 7 and 8 show both the interconnected and potential CHP systems by technology type. It is noteworthy that one of the potential CHP systems was listed as a Smartwatt Boiler<sup>9</sup>, a type of CHP that has not been reported before.

Figure 7. Interconnected CHP Technologies



<sup>9</sup> For more information on a Smartwatt Boiler, see [Enviro Power Activates First Field-Based SmartWatt Boiler - Enviro Power Technologies](#).

Figure 8. Potential CHP technologies



In the following appendices information about proposed and operational CHP systems that were reported by the EDCs and NGDCs is provided. Data identifies the county, primary technology (prime mover type), nameplate capacity, fuel type and more. System owner information is not identified for proposed systems due to possible confidentiality concerns. System owner information is provided for operational systems when that information is already known to be in the public domain. In many instances, this data can be found in the U.S. DOE’s CHP Installation Database or in press releases such as projects that have received any number of various government subsidies, such as loans, grants or rebates. Names for operating systems for which data does not appear to be in the public domain are identified as “Confidential”.

## Appendix A - Proposed CHP Systems\*

CHP System	Status*	County	Identified by		Prime Mover Type	Nameplate Capacity (MW)	Fuel Type	Thermal Energy Type
			EDC	NGDC				
Confidential	Unknown	Allegheny		X	Reciprocating Engine	21.25	Natural Gas	Hot Water
Confidential	Unknown	Allegheny		X	Reciprocating Engine	3.334	Natural Gas	Hot Water
Confidential	Unknown	Allegheny		X	Reciprocating Engine	4.3	Natural Gas	Hot Water
Confidential	Unknown	Allegheny	X	X	Reciprocating Engine	1.99	Natural Gas	Hot Water
Confidential	Unknown	Allegheny	X		Reciprocating Engine	10.5	Natural Gas	Unknown
Confidential	Unknown	Allegheny	X		Reciprocating Engine	1.732	Natural Gas	Unknown
Confidential	Unknown	Beaver		X	Reciprocating Engine	0.408	Natural Gas	Hot Water
Confidential	Unknown	Beaver	X		Reciprocating Engine	0.07	Natural Gas	Unknown
Confidential	Unknown	Bucks	X		Reciprocating Engine	1	Natural Gas	Steam
Confidential	Unknown	Cambria		X	Smartwatt Boiler	0.175	Natural Gas	Hot Water
Confidential	Unknown	Clearfield		X	Reciprocating Engine	1	Natural Gas	Hot Water
Confidential	Planning	Clinton	X	X	Microturbine	1.1	Natural Gas	Steam & Hot Water
Confidential	Unknown	Delaware	X	X	Combustion Turbine	30	Natural Gas	Steam
Confidential	Start-up	Luzerne	X	X	Combustion Turbine	1.125	Natural Gas	Steam, Hot & Chilled Water
Confidential	Planning	Philadelphia	X	X	Combustion Turbine	8.8	Natural Gas	Hot Water
Confidential	Unknown	Philadelphia	X	X	Reciprocating Engine	0.035	Natural Gas	Hot Water
Confidential	Construction	Union	X	X	Reciprocating Engine	0.668	Natural Gas	Hot Water
Confidential	Construction	Union	X	X	Reciprocating Engine	0.334	Natural Gas	Hot Water
Confidential	Unknown	Westmoreland		X	Reciprocating Engine	1.5	Natural Gas	Hot Water

\*Status:

Start-up – initial operation has begun but system not operating steady-state

Construction – under construction at the time reports were being filed; may now be operational

Planning – system is in some stage of development but not yet in construction

Unknown – prospective system has been identified but no further information is available

## Appendix B - Interconnected CHP Systems

CHP System	County	Identified by		Prime Mover Type	Nameplate Capacity (MW)	Fuel Type	Thermal Energy Type
		EDC	NGDC				
Confidential	Philadelphia		X	Unknown	0.065	Natural Gas	Thermal Energy Recovery
Confidential	Philadelphia		X	Unknown	0.13	Natural Gas	Thermal Energy Recovery
1500 Locust LTD	Philadelphia	X	X	Microturbine	0.130	Natural Gas	Hot Water
Abington Hospital	Montgomery	X	X	Combustion Turbine	4.600	Natural Gas	Steam
Confidential	Bucks	X	X	Microturbine	2.600	Natural Gas	Unknown
AIMCO - Sterling Apt. Homes	Philadelphia		X	Unknown	0.21	Natural Gas	Heat & Hot Water
AIMCO - Univ. Sq.	Philadelphia		X	Unknown	0.14	Natural Gas	Heat & Hot Water
AIMCO - 39	Philadelphia		X	Unknown	0.14	Natural Gas	Heat & Hot Water
Albright College	Berks		X	Combustion Turbine	1.100	Natural Gas	Hot & Chilled Water
American Refining Group	Bradford	X		Steam Turbine	2.000	Natural Gas	Steam
Aria Health	Philadelphia	X	X <sup>10</sup>	Reciprocating Engine	1.100	Natural Gas	Hot Water
Confidential	Allegheny	X		Microturbine	6	Natural Gas/Coal	Unknown
Confidential	Philadelphia		X	Unknown	0.13	Natural Gas	Hot Water
Brubaker Farms	Lancaster	X		Reciprocating Engine	0.335	Biogas	Process Heating
Bucknell University	Union	X	X	Combustion Turbine	5.500	Natural Gas/Oil	Steam
Cancer Treatment Center of America (Eastern Regional Medical Center)	Philadelphia	X	X	Reciprocating Engine	1.100	Natural Gas	Heat, Hot Water & Air Conditioning
Cathedral Village	Philadelphia	X	X	Unknown	0.225	Natural Gas	Heat & Hot Water, Air Conditioning

<sup>10</sup> PGW had not reported this system in their biennial report submission, however, TUS staff discovered it on page 17 of PGW's 2016 Corporate Social Responsibility Report.

Chatham University	Allegheny		X	Reciprocating Engine	0.02	Natural Gas	Hot Water
Confidential	Clarion	X	X	Steam Turbine	20	Natural Gas	Steam
Dart Container	Lancaster	X		Reciprocating Engine	11.4	Biomass/Landfill Gas	Unknown
Dept. of L&I GH Andrews Center	Cambria	X		Steam Turbine	0.450	Natural Gas	Steam
Derry Township Municipal Authority	Dauphin		X	Reciprocating Engine	0.270	Biogas	Hot Water
Confidential	Cambria	X		Steam Turbine	2.000	Natural Gas	Steam
Domtar Paper Company	Elk	X		Steam Turbine	60.000	Natural Gas	Steam
Downs Racing	Luzerne	X	X	Reciprocating Engine	0.828	Natural Gas	Hot Water
Doylestown Hospital	Bucks	X	X	Reciprocating Engine	1.600	Natural Gas	Unknown
Duquesne University	Allegheny	X	X	Combustion Turbine	5.3	Natural Gas	Steam, Hot & Chilled Water
Eden Resort	Lancaster	X	X	Reciprocating Engine	0.400	Natural Gas	Hot Water
Energy Innovation Center	Allegheny	X	X	Microturbine	0.13	Natural Gas	Hot & Chilled Water
Confidential	Allegheny	X		Microturbine	0.005	Natural Gas	Hot Water
F&M College	Lancaster	X	X	Reciprocating Engine	1.000	Natural Gas	Steam & Hot Water
Confidential	Westmoreland		X	Microturbine	0.065	Natural Gas	Hot Water
FMC Tower	Philadelphia	X		Microturbine	0.130	Natural Gas	Hot Water
Confidential	Philadelphia		X	Unknown	1.1	Natural Gas	Heat & Hot Water, Air Conditioning
FreshPet	Northampton	X	X	Reciprocating Engine	1.429	Natural Gas	Steam & Hot Water
Geisinger Hospital	Montour	X	X	Combustion Turbine	5.000	Natural Gas	Steam, Hot & Chilled Water
Grays Ferry Cogen	Philadelphia	X		Combustion Turbine	118.000	Natural Gas	Steam
Hershey Medical Center	Dauphin	X	X	Combustion Turbine	6.700	Natural Gas	Steam
Hillandale Gettysburg	Adams	X		Steam Turbine	3.240	Natural Gas	Steam
Holy Redeemer Hospital	Montgomery	X	X	Reciprocating Engine	2.000	Natural Gas	Hot Water

Imperial Tower Apts.	Philadelphia		X	Unknown	0.065	Natural Gas	Heat & Hot Water
Independence Visitor Center	Philadelphia	X	X	Reciprocating Engine	0.075	Natural Gas	Heat & Hot Water, Air Conditioning
Indiana University of PA	Indiana		X	Reciprocating Engine	24	Natural Gas/Diesel	Steam & Hot Water
Janssen (Johnson & Johnson)	Montgomery	X	X	Reciprocating Engine	3.800	Natural Gas	Steam & Hot Water
Confidential	Bradford	X		Steam Turbine	1	Natural Gas	Steam
Knouse Foods	Adams	X	X	Combustion Turbine	1.200	Natural Gas/Biogas	Steam & Hot Water
Lackawanna County Prison	Lackawanna	X	X	Reciprocating Engine	0.225	Natural Gas	Hot Water
Lancaster General Hospital	Lancaster	X	X	Combustion Turbine	3.200	Natural Gas	Steam & Hot Water
Confidential	Philadelphia	X	X	Microturbine	0.180	Natural Gas	Heat & Hot Water, Air Conditioning
Masonic Homes	Lancaster	X	X	Microturbine	0.390	Natural Gas	Hot Water
Merck & Co. 1	Montgomery	X	X	Combustion Turbine	38.000	Natural Gas	Steam
Merck & Co. 2	Montgomery	X	X	Combustion Turbine	27.000	Natural Gas	Steam
Messiah College	Cumberland	X	X	Microturbine	1.000	Natural Gas	Hot Water
Mt. Joy Wire	Dauphin	X	X	Reciprocating Engine	1.059	Natural Gas	Steam & Hot Water
Newman & Company	Philadelphia	X		Steam Turbine	1.800	Natural Gas/Fuel Oil	Steam
Confidential	Blair	X	X	Steam Turbine	2	Natural Gas	Steam & Hot Water
Omnova	Schuylkill	X	X	Reciprocating Engine	1.426	Natural Gas	Steam
Park Towne Place Associates 1	Philadelphia	X	X	Unknown	0.210	Natural Gas	Heat & Hot Water, Air Conditioning
Park Towne Place Associates 2	Philadelphia	X	X	Unknown	0.210	Natural Gas	Heat & Hot Water, Air Conditioning

Penn State University	Centre	X	X	Steam Turbine	7.000	Natural Gas	Steam
Peoples Etna Office	Allegheny	X	X	Reciprocating Engine	0.035	Natural Gas	Hot Water
Pepsico/Gatorade	Luzerne	X	X	Steam Turbine	2.000	Natural Gas	Hot Water
PGW	Philadelphia		X	Unknown	0.2	Natural Gas	Heat, Hot Water, Air Conditioning
PH Glatfelter	York	X		Steam Turbine	35.000	Black Liquor	Steam
Confidential	Indiana		X	Fuel Cell	0.005	Natural Gas	Hot Water
Phil. College Osteo Medicine	Philadelphia		X	Unknown	0.13	Natural Gas	Heat
Confidential	Philadelphia		X	Unknown	8	Natural Gas	Peak Shaving
Phoenix Contact	Dauphin	X	X	Microturbine	1.000	Natural Gas	Hot & Chilled Water
Procter & Gamble 3	Wyoming	X		Steam Turbine	2.645	Natural Gas	Steam
Proctor & Gamble 1	Wyoming	X	X	Steam Turbine	57.800	Natural Gas	Steam
Proctor & Gamble 2	Wyoming	X		Steam Turbine	53.000	Natural Gas	Steam
PSECU	Lancaster	X	X	Microturbine	0.800	Natural Gas	Hot Water
Reading Hospital	Berks	X	X	Steam Turbine	10.000	Natural Gas	Steam
Rittenhouse Claridge	Philadelphia	X	X	Reciprocating Engine	0.225	Natural Gas	Heat & Hot Water
Robert Packer Hospital	Bradford	X	X	Steam Turbine	2.000	Natural Gas	Steam
SCI Laurel Highlands	Somerset	X	X	Steam Turbine	6.800	Methane/Natural Gas	Steam
Seneca Landfill	Butler		X	Reciprocating Engine	0.3	Biogas	Hot Water
Sewage Plant (City of Philly)	Philadelphia	X	X	Reciprocating Engine	5.670	Natural Gas/Biogas	Heat
Simpson House	Philadelphia	X	X	Reciprocating Engine	0.265	Natural Gas	Heat & Hot Water
South Hills Retirement	Allegheny	X	X	Microturbine	0.065	Natural Gas	Hot Water
Confidential	Dauphin		X	Reciprocating Engine	0.800	Renewable Gas/Natural Gas	Unknown
Thomas Jefferson Gibbon	Philadelphia	X		Steam Turbine	0.275	Natural Gas	Steam
UGI Headquarters	Dauphin	X	X	Microturbine	0.130	Natural Gas	Hot & Chilled Water
UGI Utilities, Middletown	Dauphin		X	Microturbine	0.130	Natural Gas	Hot Water

Confidential	Warren	X		Steam Turbine	29.000	Natural Gas	Steam
Urban Outfitters	Philadelphia		X	Unknown	0.8	Natural Gas	Unknown
Valley Forge Casino & Resort	Montgomery	X	X	Microturbine	0.065	Natural Gas	Hot Water
Villanova University	Montgomery	X	X	Reciprocating Engine	2.000	Natural Gas	Steam
Williamsport Hospital	Lycoming	X	X	Reciprocating Engine	1.900	Natural Gas	Unknown
York Solid Waste Authority	York		X	Steam Turbine	40	Solid Waste/Natural Gas	Steam
Yuengling Brewery	Schuylkill	X	X	Reciprocating Engine	0.860	Methane/Natural Gas	Hot Water
Yuengling Creamery	Schuylkill	X		Reciprocating Engine	0.180	Biogas/Natural Gas	Anaerobic Digester Heating & Space Heating