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Distributed Generation: Cleaner, Cheaper, Stronger

Industrial Efficiency in Pennsylvania's Changing Utility Landscape

Overview

Distributed energy sources—which generate electricity where it is used—protect businesses and institutions from unexpected outages caused by natural disasters and other disruptions. Industrial energy-efficient systems such as combined heat and power (CHP) and waste heat to power (WHP) can help make the country's electricity sector cleaner, cheaper, and more secure.

CHP and WHP have experienced periodic expansions over the past 40 years across the commercial, industrial, and institutional sectors in rural and urban settings. By producing heat and power from a single fuel source, CHP has double the efficiency of central-station power generation. WHP captures heat that would typically be vented from an industrial facility and uses it to make electricity with no additional combustion or incremental emissions. To realize the full benefits of distributed generation, Congress should pass legislation that allows more companies and institutions to deploy these energy-efficient systems.

Electricity generation in the Keystone State

According to the U.S. Department of Energy, Pennsylvania is one of the top electricity-generating states in the country and, in 2013, ranked third nationwide.[1] In 2014, the state obtained two-thirds of its power from nuclear and coal plants: 35.5 percent and 36.1 percent, respectively.[2] Despite its reliance on traditional resources, however, the state has begun to take advantage of cleaner options. Since 2000, when Pennsylvania installed its first wind project, wind generation has become its largest renewable resource, followed by hydropower, biomass, and solar.[3] Last year, in-state renewable electricity generation accounted for 4 percent of Pennsylvania's net production.[4]

Pennsylvania's industrial sector ranks seventh nationwide in energy use and is responsible for 33.6 percent of total state consumption. The manufacturing sector accounts for 12 percent of Pennsylvania's total gross state product—$77 million in 2013—and employs nearly 10 percent of the workforce.[5]

The state's industrial economy offers potential for increased CHP and WHP capacity. From 2005 to 2010, Pennsylvania ranked fifth in the country in new CHP deployment, adding 25 projects, and ninth in the total capacity of those installations at 80.9 megawatts.[6] Since 2010, the state has added 35 projects at 164 diverse sites, including hotels, wastewater treatment plants, agricultural facilities, chemical processors, and health care complexes, bringing Pennsylvania's total installed capacity to 3.3 gigawatts as of December 2014.[7] State policies have expanded deployment of distributed generation resources, including CHP and WHP, and continue to drive development.

State energy policies

Demand drivers

Pennsylvania's alternative energy portfolio standards, established in 2004, require that 18 percent of electricity sold come from approved renewable or alternative sources by 2021.[8] Of that, 8 percent must come from Tier 1 renewable sources, which include solar, wind, low-impact hydropower, geothermal, most biomass, biologically or coal-derived methane gas, and fuel cells. Ten percent must come from Tier 2 alternative energy sources, such as advanced coal technologies, certain biomass projects, conventional hydropower, on-site distributed generation at homes and businesses, and utility incentives for customers to reduce consumption. Both CHP and WHP qualify as Tier 2 resources.[9]

Grid integration

The alternative energy portfolio standards also require the Pennsylvania Public Utility Commission to adopt policies that enable distributed generation, including interconnection standards, which authorize residential and industrial customers to connect to the grid, and net metering, which allows customers to offset power costs by returning excess electricity from on-site systems to the grid in exchange for a credit. In 2012, the commission expanded these programs to permit nonutilities, such as private developers, to own distributed systems on properties that belong to businesses or homeowners.[10] CHP systems up to 5 MW are subject to standard interconnection fees, and those up to 3 MW—as well as microgrid systems up to 5 MW—are eligible for net metering.[11]

Financial incentives

Since 2004, the Pennsylvania Energy Development Authority (PEDA) has invested approximately $10 million annually in clean power generation systems, including CHP. PEDA has authority to award grants, loans, and loan guarantees and to develop other types of funding programs.[12] The last grant and loan cycle was in 2014 and offered $1.25 million.[13] Additionally, tax-exempt and taxable bond financing for energy projects is available through the Pennsylvania Economic Development Financing Authority, which provides low-interest loans to businesses in the state.[14]

Emission reduction and energy goals

First released in 1984 and last revised in 2014, the Pennsylvania Energy Development Plan aims to ensure abundant, affordable, diverse, domestic power options for the state's residents and businesses by expanding the market for clean indigenous resources.[15] PEDA oversees the plan and allocates financial and technical assistance to support clean advanced energy projects, including distributed generation broadly and CHP specifically.[16] In addition, the state's Climate Change Action Plan, which was released in 2009 and updated in 2013, identifies CHP as an option for reducing fuel use and emissions and promotes project development.[17]

Harnessing Energy Efficiency to Power Industry

Phoenix Contact, a manufacturer of electrical engineering and automation products in Lower Swatara Township, helped Capstone Turbine Corp. install a 1-megawatt CHP facility in 2014. The system provides 65 percent of the factory's energy needs and saves the company more than $300,000 annually.* The project also acts as a redundant source of power and allows the facility to operate at full production during local blackouts.† In 2015, the project received the Governor's Award for Environmental Excellence.‡

* Capstone Turbine Corp., "Capstone Turbine, E-Finity, and Phoenix Contact Celebrate Earth Day With a Wire Cutting Ceremony at a Newly Installed C1000 CCHP Installation in Pennsylvania," news release, April 23, 2014, http://www.capstoneturbine.com/news/press-releases/detail/3144/capstone-turbine-e-finity-and-phoenix-contact-celebrate.

† Capstone Turbine Corp., "Phoenix Contact," last modified May 28, 2015, http://www.e-finity.com/case-studies/Commercial/PhoenixContact_lowres.pdf.

‡ Electrical Distributor, "Phoenix Contact Receives Governor's Award for Environmental Excellence," *tED Magazine* (May 1, 2015), http://www.tedmag.com/News/manufacturer-news/Phoenix-Contact-Receives-Governors-Award-for-Environmental-Excellence.aspx.

Modeling findings

The Pew Charitable Trusts commissioned ICF International Inc. to analyze proposed policy to determine the effect of industrial energy efficiency technologies on future market deployment. ICF modeled the impact of an investment tax credit for CHP and WHP that is on par with what other clean and efficient systems receive, as outlined in the Power Efficiency and Resiliency (POWER) Act of 2015 (S. 1516/H.R. 2657).[18]

In Pennsylvania, market deployment for CHP and WHP would increase by 21 percent over the status quo for a projected 498 MW of additional capacity by 2030 if the investment tax credit were extended to these technologies. CHP would account for 183 MW, and WHP would make up 315 MW, nearly two-thirds of the growth.

Conclusion

Industrial energy-efficient systems such as CHP and WHP represent tremendous potential to reduce power consumption, save companies and institutions money, balance distribution by limiting peak demand, and create businesses and jobs, all while decreasing emissions. These projects are cleaner, cheaper, and more secure than traditional generation—factors that make them essential components of the resilient, efficient, distributed grid of the future. Improving the federal investment tax credit to create parity among clean and efficient technologies would reduce market barriers and spur adoption of CHP and WHP.

Pennsylvania

Table 1

Snapshot of CHP and WHP in Pennsylvania

Deployment, national ranking, and policies

Policies	
Demand drivers	
Renewable and/or alternative energy portfolio standard	✓
Energy efficiency resource standard	
Grid integration	
Net metering	✓
Interconnection standards	✓
Financial incentives	
Tax credits/incentives	✓
Grants and/or loans	✓
Emission reduction and energy goals	✓

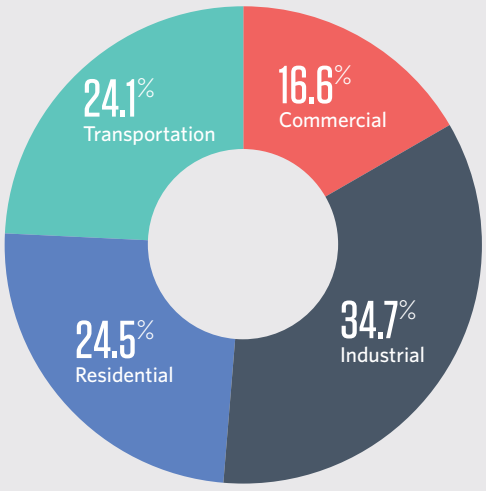
Statistics as of Dec. 31, 2014	
Installed capacity	3.3 GW
Number of installations	164
Installed capacity rank	8th
Five-year capacity growth	62 MW

Source: NC Clean Energy Technology Center, U.S. Environmental Protection Agency, and ICF International

Figure 1

Industrial Sector Uses the Most Energy in Pennsylvania

Energy consumption by end-use sector, 2013

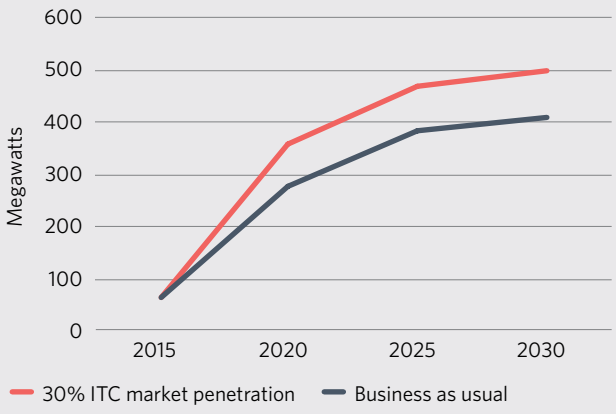


Source: U.S. Energy Information Administration

Figure 2

Improved Policy Could Result in 21% Increase in Deployment of CHP and WHP in Pennsylvania

Capacity growth with business as usual vs. enhanced investment tax credit, 2015-30, in MW

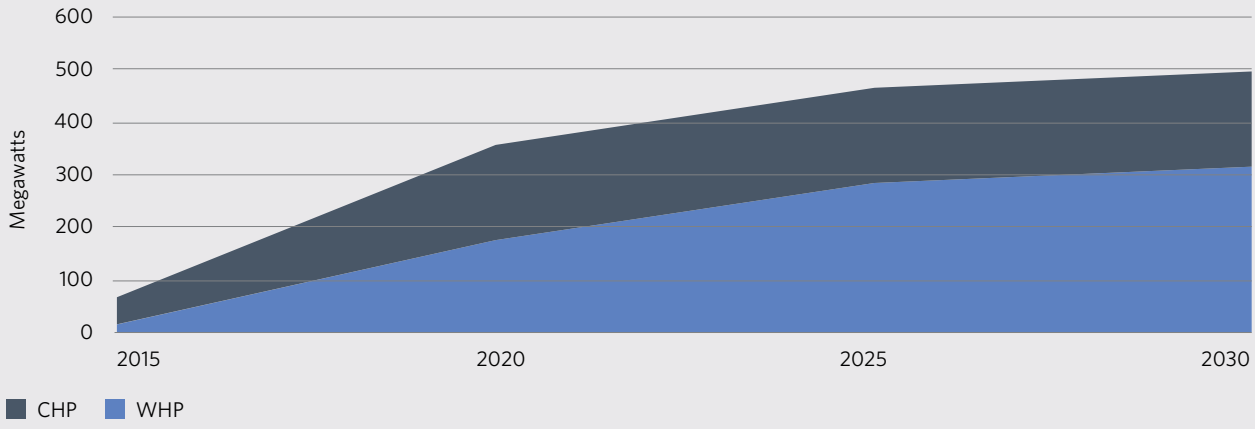


Source: ICF International

Figure 3

Improved Policy Could Result in 498 MW of New CHP and WHP Capacity by 2030 in Pennsylvania

Anticipated market penetration with enhanced investment tax credit, 2015-30, in MW

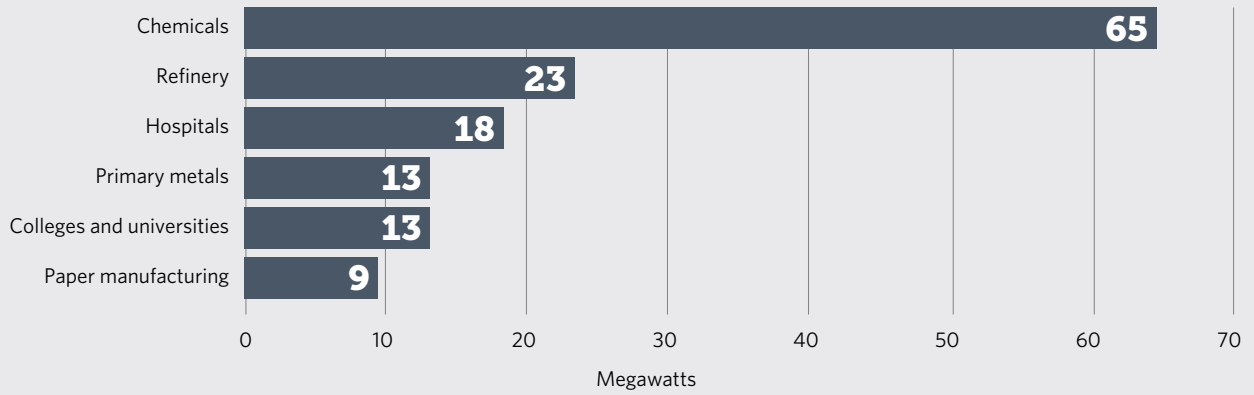


Source: ICF International

Figure 4

Pennsylvania Chemical Sector Could See Greatest CHP and WHP Deployment Opportunity With Enhanced Investment Tax Credit

Top sectors in projected additional market penetration by 2030, in MW



Source: ICF International

Endnotes

1 U.S. Energy Information Administration, "Pennsylvania State Profile and Energy Estimates—Profile Analysis," http://www.eia.gov/state/analysis.cfm?sid=PA.

2 U.S. Energy Information Administration, "Pennsylvania State Profile and Energy Estimates—Profile Overview," http://www.eia.gov/state/?sid=PA.

3 U.S. Energy Information Administration, "Pennsylvania State Profile and Energy Estimates—Profile Analysis."

4 Ibid.; U.S. Energy Information Administration, "Pennsylvania State Profile and Energy Estimates—Profile Overview."

5 National Association of Manufacturers, "Pennsylvania Manufacturing Facts," http://www.nam.org/Data-and-Reports/State-Manufacturing-Data/2014-State-Manufacturing-Data/Manufacturing-Facts--Pennsylvania.

6 Anna Chittum and Nate Kaufman, "Challenges Facing Combined Heat and Power Today: A State-by-State Assessment," American Council for an Energy-Efficient Economy (Sept. 28, 2011), http://aceee.org/research-report/ie111.

7 U.S. Department of Energy, "Combined Heat and Power Installations in Pennsylvania," U.S. DOE Combined Heat and Power Installation Database, https://doe.icfwebservices.com/chpdb/state/PA.

8 Center for Climate and Energy Solutions, "Renewable and Alternative Energy Portfolio Standards," http://www.c2es.org/node/9340; North Carolina State University, "Alternative Energy Portfolio Standard," (Sept. 4, 2014), http://programs.dsireusa.org/system/program/detail/262.

9 Anna Chittum and Nate Kaufman, "Challenges Facing Combined Heat and Power Today."

10 North Carolina State University, "Pennsylvania Net Metering," Database of State Incentives for Renewables & Efficiency, http://programs.dsireusa.org/system/program/detail/65.

11 U.S. Environmental Protection Agency, "Pennsylvania Net-Metering Rules," CHP Policies and Incentives Database, http://www3.epa.gov/chp/policies/policies/pepennsylvanianetmeteringrules.html; U.S. Environmental Protection Agency, "Pennsylvania Interconnection Standards," CHP Policies and Incentives Database, http://www3.epa.gov/chp/policies/policies/pepennsylvaniainterconnectionstandards.html.

12 Natural Resources Defense Council, "Renewable Energy for America: Pennsylvania," http://www.nrdc.org/energy/renewables/penn.asp.

13 Michael Harris, "Pennsylvania Announces Grant Program for Hydroelectric Power, Renewable Development," *HydroWorld*, June 12, 2014, http://www.hydroworld.com/articles/2014/06/pennsylvania-announces-grant-program-for-hydroelectric-power-renewable-development.html; Pennsylvania Department of Environmental Protection, "Pennsylvania Energy Development Authority 2014 Financial Assistance Guidelines," http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-100913/2014%20PEDA%20Assistance%20Guidelines.pdf.

14 Pennsylvania Department of Environmental Protection, "Grants, Loans, and Rebates," http://www.depreportingservices.state.pa.us/ReportServer/Pages/ReportViewer.aspx?/Grants/GrantLoans.

15 Pennsylvania Department of Environmental Protection, "*The Pennsylvania Energy Development Plan*," Oct. 16, 2014, http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-102875/0120-BK-DEP4454%20combined.pdf.

16 Ibid.

17 U.S. Environmental Protection Agency, "Pennsylvania Final Climate Change Action Plan," CHP Policies and Incentives Database, http://www3.epa.gov/chp/policies/policies/pepennsylvaniafinalclimatechangeactionplan.html.

18 The Pew Charitable Trusts, *Distributed Generation: Cleaner, Cheaper, Stronger—Industrial Efficiency in the Changing Utility Landscape* (October 2015), http://www.pewtrusts.org/~/media/assets/2015/10/cleanercheaperstrongerfinalweb.pdf. The full methodology for this analysis is provided in the appendix of the report.

For further information, please visit:

pewtrusts.org/cleanenergy

Contact: Michelle Blackston, communications officer
Email: mblackston@pewtrusts.org
Project website: pewtrusts.org/cleanenergy