

Combined Heat and Power and Clean Distributed Energy Policies

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CONGRESS SHOULD

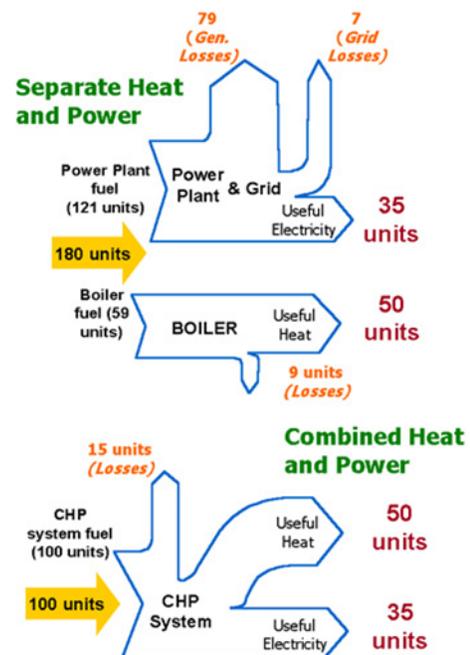
- Encourage states to adopt the NARUC model interconnection protocols.
- Encourage states to implement improved standby rates.
- Encourage the adoption of output-based air emissions regulations by states.
- Provide funding for technical assistance and implementation grants of clean distributed generation as authorized in federal legislation.¹

THE ISSUE

Combined heat and power (CHP) systems generate electricity and useful thermal energy in a single, integrated system. CHP is not a technology, but a particular way to deploy existing technologies. Heat that is normally wasted in conventional power generation is recovered as useful energy, so CHP systems are more efficient and provide environmental, economic, and energy system infrastructure benefits. However, several barriers impede cost-effective CHP applications, including lack of common interconnection protocols, discriminatory standby rates, and emissions regulations that do not recognize the improved efficiency levels of CHP systems.

SUMMARY

Combined heat and power (CHP) systems, also known as cogeneration systems, generate electricity and useful thermal energy in a single, integrated system (see figure). In some existing generation systems, additional equipment can be installed to recover energy that would otherwise be wasted (sometimes called waste energy recovery). Traditionally, electricity is generated at a central power plant, and on-site heating and cooling equipment is used to meet non-electric energy requirements. In a CHP system, the electricity is produced on-site, and the thermal energy is recovered and used for heating or cooling a nearby building, or for use in industrial processes. Because CHP makes use of what would otherwise be wasted, the combined efficiency of these integrated systems is much greater than from traditional separate systems (e.g., in the example in the figure, the CHP system has an efficiency of 85% while the separate systems have a combined efficiency of only 45%). And since power is produced on-site, transmission and distribution losses (typically 7%) are also avoided.



CHP is widely used in the steel, chemical, paper and petroleum refining industries, and at large institutional campuses such as universities. In recent years, smaller CHP systems have made inroads in the food, pharmaceutical and light manufacturing industries; in commercial buildings; and at institutions such as hospitals. A recent report² funded by the U.S. Department of Energy (DOE), suggests that the U.S. could see a 50% increase – about 40GW – in total installed CHP generating capacity by 2020. Although technologies used in CHP

¹ Section 451 of the *Energy Independence and Security Act of 2007*.

² See *Combined Heat and Power: A Clean Energy Solution*. August

2012. http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_clean_energy_solution.pdf.

systems have improved in recent years and CHP has become cost-effective in many applications, significant hurdles remain that limit widespread deployment of CHP. As a result, less efficient separate heat and power systems still predominate. The barriers include:

- A lack of **national business practice standards for the interconnection** of CHP systems to the local electric utility grid. Interconnection is the process of connecting a CHP system, or any distributed energy resource, to the transmission or distribution grid. This lack of uniform standards results in a patchwork of regulatory models that vary from state to state. Some utilities require costly and complex studies and installation of unnecessary and expensive equipment that discourages CHP.
- The presence of **discriminatory standby rates** and prohibitive "exit fees" imposed by utilities to customers that implement CHP at existing facilities. The [National Association of Regulatory Utility Commissioners](#) (NARUC) has adopted model standards³ which are favorable to CHP and distributed energy resources. This model would be acceptable for implementation at the state and utility level. Additionally, [the State & Local Energy Efficiency Action Network](#) (SEE Action) has identified key components of successful interconnection standards and standby rates that support CHP.⁴
- The variety of current **emissions regulations** that act as a barrier to CHP systems because they fail to recognize the overall energy efficiency of CHP or credit the emissions avoided from the displaced centralized grid electricity generation. The more common regulatory approach relies on an input-based standard, which measures emissions as pounds of pollutant per BTU of input fuel, basing that calculus on the traditional relationship of fuel input to a typical power plant. This method does not account for the useful thermal output a CHP system provides, and fails to appropriately credit the efficiency of the system. Alternatively, output-based standards link emissions to the generator's final useful energy output. This approach rewards generators that have the highest output of megawatt-hours and the lowest related output of pollutants. Output-based standards calculate emissions based on the amount of electricity generated, which can be represented in pounds of pollutant per megawatt-hour. Using an output-based measurement encourages greater energy efficiency and pollution reduction, reducing the environmental impact of the power sector while enhancing the amount of available power in the U.S. EPA has provided guidance on implementation of output-based regulations, but so far only 17 states have adopted this regulatory approach.⁵

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³ The National Association of Regulatory Utility Commissioners. 2003. *Model Interconnection Procedures and Agreement for Small Distributed Generation Resources*. http://www.naruc.org/Publications/dgiaip_oct03.pdf

⁴ The SEE Action publication Guide to the Successful Implementation of State Combined Heat and Power Activities is available here: http://www1.eere.energy.gov/seeaction/chp_policies_guide.html.

⁵ See the US Environmental Protection Agency's *Output-Based Regulations: A Handbook for Air Regulators* is available here: http://www.epa.gov/chp/documents/obr_final_9105.pdf.