Combined Heat and Power

Challenges and Opportunities in the Midwest

Combined Heat and Power (CHP), also called cogeneration, is a method of generating both heat and mechanical or electrical energy from a single fuel source. CHP can include on-site generation facilities, waste-heat recovery and the systemic integration of a variety of technologies, applications and fuels all at one facility.

In many cases, CHP uses natural gas, process-related fuels, high-pressure steam, or waste heat that would typically be released into the atmosphere to generate electricity, while using the resulting or remaining heat to replace fossil-fuel fired heat sources, thereby conserving fuels.

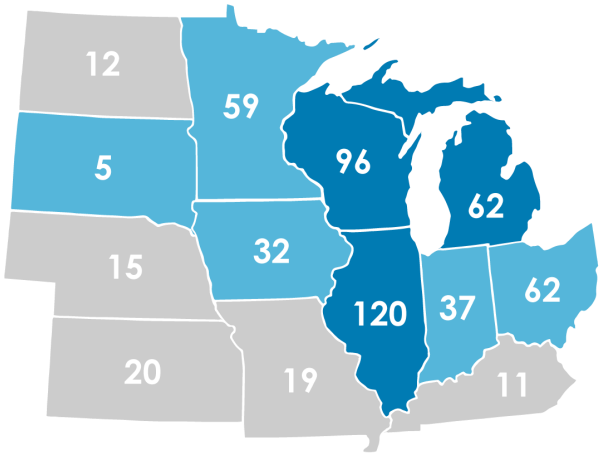
CHP can be more efficient and cost-effective than providing heat and electricity separately since the heat that is normally wasted in conventional power generation is recovered.

CHP in the Midwest

CHP could potentially play a large role in the region by helping industrial customers improve economic competitiveness and reduce energy bills.

- Industrial customers account for **33% of the Midwest's energy use**.
- When appropriately designed, CHP can achieve **80% overall efficiency**, factoring in both electricity generation and heat usage. The average central power plant is only about 40% efficient.
- Eight Midwestern states have either an interconnection standard or an energy efficiency resource standard (EERS)/ renewable energy portfolio standard (RPS) that includes CHP.
- As of 2015, the Midwest region has approximately 12 GW of installed CHP capacity out of 84 GW nationally.

Number of CHP Sites by State

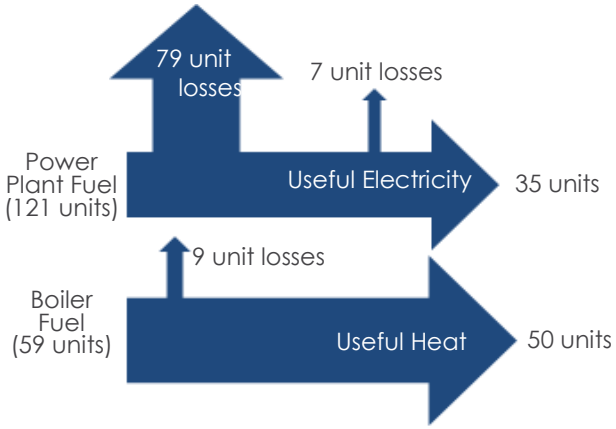


States with an Interconnection Standard

States with CHP included in their EERS or RPS

U.S. Department of Energy, 2017

Conventional Generation



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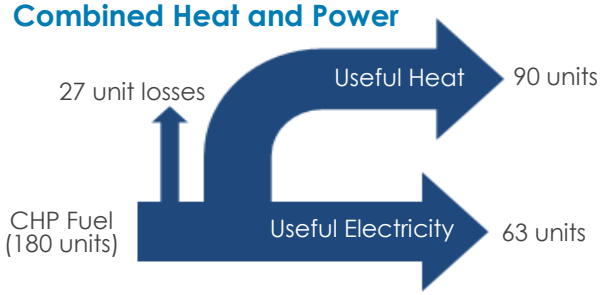

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CHP Challenges in the Midwest

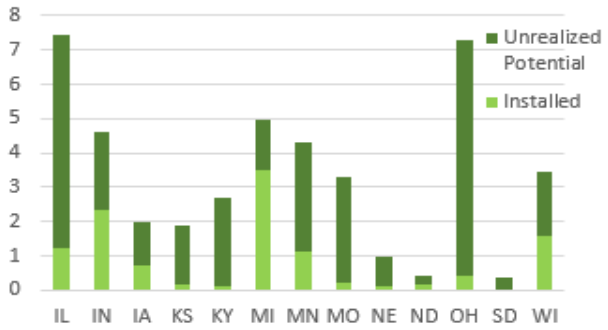
Costs and Payback

CHP's high upfront cost may discourage future investment despite positive returns. CHP benefits, like avoiding of electric outages and reducing emissions, can also be difficult to quantify.

Uncertainty

Electric restructuring creates uncertainty in electricity pricing and reliability which often leads to delays in CHP investments. Gas price volatility creates uncertainty in savings.

Unrealized Technical Potential (Gw)



Technical potential est. based on ICF International (2016); Installed CHP data from U.S. DOE (2017)

Installation Issues

The permitting process can be long, cumbersome and costly.

Lack of Education and Awareness

Many businesses are unfamiliar with CHP benefits. Finding reliable case studies and experienced experts can be difficult.

Standby Rates

Standby rates are charges levied by utilities when a CHP system experiences an outage and, subsequently, must rely on power purchased from the grid. A key condition for the economic viability of CHP is that the avoided costs of purchasing electricity from the grid are greater than the capital and operating costs involved in building the facility. Excessive standby rates and other charges can upset this balance by adding to operating costs, negatively impacting the economics of CHP systems.

How to Encourage CHP Development in the Midwest

Financial Incentives

State financial incentives are an important instrument for increasing the use of technologies that provide benefits to both residents and the state overall. Incorporating a financial incentive can make CHP and other energy efficiency investments more alluring and help overcome barriers to market entry. The majority of financial incentives for CHP systems are loans and grants.

Inclusion in Renewable and Efficiency Standards

An energy efficiency resource standard (EERS) is a quantitative, long-term energy savings target for utilities, under which they must procure a portion of their future electricity and natural gas needs using energy efficiency measures. A similar policy mechanism to encourage renewable energy production is a renewable portfolio standard (RPS). When CHP is explicitly listed as eligible for RPS or EERS credit, it creates a large incentive for deployment. CHP systems receive credit to the extent that energy is saved relative to conventional generation of heat and electricity.

Interconnection Standards

To remain economically viable, CHP systems rely on an ability to purchase backup power from the electric grid and to sell excess electricity they generate back to it. To encourage CHP development, an interconnection standard that includes CHP and explicitly establishes a framework for connecting to the grid reduces the monetary and transaction costs for manufacturers and owners.

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