Midwest Cogeneration Association

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VIA EMAIL
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July 25, 2014

Anthony M. Star
Director
Illinois Power Agency
160 North LaSalle Street
Suite C-504
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Re: Midwest Cogeneration Association
Response to Request for Comments on
Energy Efficiency as a Supply Resource

Dear Mr. Star:

The Midwest Cogeneration Association (MCA) appreciates this opportunity to comment on the exciting prospect of the Illinois Power Agency (IPA) including energy efficiency as a supply resource in its 2015 procurement plan.

MCA is a not-for-profit professional association founded in 1984 and dedicated to promoting clean and energy efficient Combined Heat and Power and Waste Heat-to-Power technologies (collectively referred to here as "CHP") in eight Midwest states, including Illinois. MCA members include representatives of CHP technology manufacturers, distributors, and project developers, energy efficiency analysts, and energy and environmental consultants and attorneys. Our members have expertise in CHP technologies and project financing and development. MCA is an active a participant in the Illinois Energy Efficiency Stakeholder Advisory Group.

By these comments, MCA would like to urge the IPA to recognize CHP technologies as an eligible energy efficiency supply resource in its upcoming procurement plan.

What are Combined Heat and Power and Waste Heat-to-Power technologies?

Two technologies are often grouped under the term "combined heat and power" or "cogeneration." Although they operate differently, combined heat and power ("CHP") and waste heat to power ("WHP") systems are both efficient and clean approaches to generating electricity and useful thermal energy from a single fuel source. Both of these technologies fall squarely within the statutory definition of "energy efficiency."

The term "combined heat and power" means a system that simultaneously and efficiently produces useful thermal energy and electricity. Various state and federal definitions include certain efficiency requirements as well, depending on their goals. Whereas a typical coal or natural gas burning power plant is 33% efficient, CHP systems can be 60%-85% efficient.

In a CHP system, fuel is combusted in a "prime mover" (such as a gas turbine, microturbine, reciprocating engine, or fuel cell) located at a commercial, institutional or industrial facility for the purpose of generating both electricity and thermal energy. The thermal energy is recovered to provide process or space heating, cooling, and/or dehumidification. Optimally efficient CHP systems are typically designed and sized to meet a facility's base-load thermal demand.

The term "waste heat to power" refers to systems that capture process waste heat and transfer or convert it to electrical or mechanical energy using no additional fuel and producing no additional emissions. The use of recovered waste heat decreases the total amount of fuel or electricity required for a given process and thus increases the total efficiency of the process or facility. Fifteen states consider waste heat to power to be renewable-equivalent energy.

Should CHP technologies be included in the IPA's Energy Procurement Plans?

The answer to this is an emphatic "YES!" CHP technologies are well-established energy efficiency technologies that offer both demand-side reductions at host facilities and supply-side resources in the form of excess electric power that can be made available to the grid during peak and even super peak hours.

These technologies offer a cost-effective way to produce reliable, distributed base-load electric generation far more efficiently than conventional centralized power generation and with far fewer emissions.

Conventional power generation is incredibly inefficient, having languished at only 33 percent since Dwight Eisenhower occupied the White House. Roughly two-thirds of energy inputs are sacrificed as wasted heat and line losses. Because CHP simultaneously produces both heat and electricity from a single fuel source, this inefficiency is "turned on its head" – achieving efficiencies of 60 to more than 80 percent. Instead of the conventional method of generating electricity at a central station power plant (normally with an efficiency of approximately 33%) and burning additional fuel in an on-site furnace or boiler to produce the required thermal energy (normally at an energy efficiency of approximately 80 percent), an on-site CHP system provides an industrial or commercial facility's thermal and electricity requirements from a single fuel source with higher efficiency. At the same time, a WHP project utilizes industrial waste energy in order to produce clean power without burning any incremental fuel or emitting any incremental pollution.

An on-site CHP system sized properly for a facility's thermal load can provide both electricity and thermal energy at efficiencies of 60 to more than 80 percent versus the combined efficiency of the conventional method, which is approximately 40-45 percent. Due to the reduced fuel use, CHP systems provide significant emission reductions compared to conventional methods of separately meeting a facility's electricity and thermal requirements. Onsite WHP systems are even better. They utilize excess and otherwise lost heat to produce energy with zero additional fuel and zero additional emissions.

Because one key challenge is the initial investment cost of a CHP or WHP system, expressly including these technologies in the IPA's procurement plans will help move the market forward while providing a significant baseload peak and super-peak energy resource for Illinois.

What is the potential for CHP technologies to contribute to Illinois energy supplies?

CHP are both an existing and growing energy efficiency resource opportunity for the IPA. In August 2012, the White House set a goal of increasing deployment by 40 gigawatts (GW) by 2020 (a 50-percent increase from current levels). In announcing this goal, the president explained that increasing CHP by this level would save one quadrillion Btus (Quad) of energy and reduce CO_2 emissions by 150 million metric tons annually (the equivalent of removing 25 million cars from the road) – while supporting $40-$80 billion in new capital investment.[1]

The U.S. Department of Energy and ICF International's Combined Heat and Power Database lists 1,271 megawatts (MW) of installed CHP capacity at 139 sites in Illinois.[2] However, the Department of Energy's (DOE) Midwest Clean Energy Application Center, now the DOE's Midwest CHP Technical Assistance Program, and other studies have found there is significant unrealized potential for additional CHP and WHP in Illinois. Although there is significant potential within the public sector, the DOE found the majority of the technical potential for CHP and WHP resides in the industrial and large commercial market sectors. [3]

Because of this unrecognized energy efficiency potential, the State of Illinois adopted a State Action Plan in 2013 that directs various state agencies to explore avenues by which the state can encourage the deployment of CHP and WHP systems in Illinois.

Can CHP technologies reliably generate peak power for IPA procurement?

CHP is a well-established, long-proven technology that was actually included in Thomas Edison's first electric engines. Moreover, CHP technology is a highly reliable energy resource which is typically available over 95% of the time, with approximately half of the outages due to planned maintenance. [4] While the remaining 2.5% outage rate is random and could occur during the local utility's peak demand, there is a 97.5% probability that this local generation will be operating during local grid peak. Furthermore a grid with multiple distributed generators, including CHP technologies, will offset that low 2.5% outage and reliably supplement the

[1] White House Executive Order, Accelerating Investment in Industrial Efficiency (August 30, 2012).
[2] ICFI CHP Database. Accessible at http://www.eea-inc.com/chpdata/States/IL.html
[3] Id.
[4] Energy and Environmental Analysis, Distributed Generation Operational Reliability and Availability Database, Arlington, VA, Jan 2004. Prepared for Oak Ridge National Laboratory under ORNLSubcontract No. 400021456. This database is a compilation of actual, in-field data from the installed fleet of distributed generators.

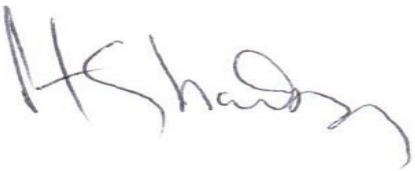
conventional centralized power supply. See *The Legal Case Against Standby Rates*, Casten and Karegianes, The Electricity Journal, Nov. 2007.[5] CHP systems are well positioned to provide ancillary and capacity services to the grid—helping to stabilize grid voltage with timely response. In fact, CHP is currently providing ancillary services to utilities in other states. See *Utilities and CHP Value Proposition*, Chittum and Farley, ACEEE, Report E134, Washington, DC, July 2013. [6]

What are the overall benefits of including CHP technologies in the IPA procurement plan for the Illinois electric grid and for Illinois energy consumers?

- Energy savings system-wide, resulting in lower costs to Illinois consumers;
- Reductions in peak demand, resulting in fewer "black outs" and "brown outs" and less need to build new and expensive power plants to meet consumer requirements;
- Reduction in "line losses" due to the "distributed" nature of CHP and WHP systems (Line losses average 7 percent and can reach 20 percent during periods of peak demand.);
- Reduction in load on existing transmission and distribution lines and reduced need to repair and build new lines, again due to the distributed nature of CHP and WHP systems;
- Lower emissions of greenhouse gases, criteria pollutants (such as NOx, SO_2 and PM), and hazardous air pollutants;
- Job creation and increases in Illinois' manufacturing competitiveness; and
- Increased energy resiliency during natural disasters and other emergencies due to the distributed nature of CHP and WHP systems. (As noted, the Illinois Energy Assurance Plan, adopted in 2013, includes distributed CHP and WHP systems as elements of the state's energy resiliency planning.) [7]

Thank you for this opportunity to present comments on this important topic. MCA and its members would be pleased to provide any additional information on CHP technologies the IPA may require.

Respectfully submitted,



Patricia F. Sharkey

MCA Policy Committee Chair

[5] http://www.recycled-energy.com/_documents/articles/sc_electricity_journal11-07.pdf
[6] https://aceee.org/research-report/ie134.
[7] State of Illinois Energy Assurance Plan, 2013. Accessible at http://www.erc.uic.edu/eap/state-of-illinois-energy-assurance-plan.html