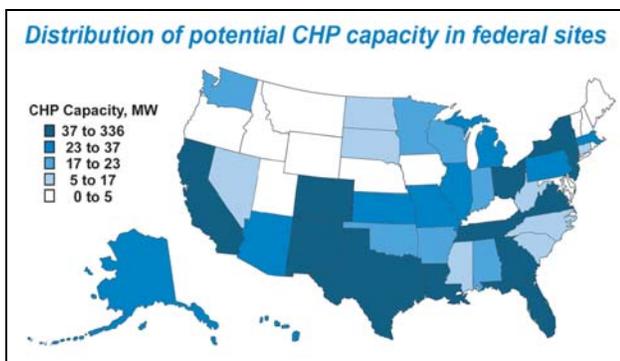


# Federal Energy Management Program Combined Heat and Power (CHP) Overview

## Why CHP?

Combined heat and power (also known as CHP; cogeneration; or cooling, heating, and power) is the sequential production of two forms of useful energy—typically electricity and heat—from a single fuel source. CHP offers extraordinary benefits in terms of energy efficiencies and emissions reductions by optimizing the use of heat that would otherwise be wasted when generating power. CHP systems can improve power quality, reliability, and overall energy security. The U.S. Department of Energy (DOE) and Environmental Protection Agency (EPA) are committed champions of CHP.



*Significant potential for cost-effective CHP exists at Federal sites—more than 1500 megawatts (MW) nationwide. As electricity prices rise, CHP economics improve.*

When CHP replaces central-station power generation, carbon emissions are typically reduced by 30 percent. CHP systems, on average, can be about twice as efficient as central-station power plants and on-site boilers. Currently, CHP generates about seven percent of the total electrical power in the United States.

- CHP can be financed by private-sector partners and pay for itself with the savings it reaps.
- CHP offers greater flexibility in power systems and can help meet Federal energy-efficiency and emissions reduction goals.
- CHP technology lays the foundation for the integration of sustainable fuels and emerging technologies (e.g., hydrogen, fuel cells).

## Challenges

Given the great potential for CHP at Federal sites, why haven't more facilities installed this technology?

- Historically low tariffs for electricity
- High initial cost of CHP systems
- Limited budgets for capital improvement
- Complexity of CHP systems (need for custom engineering and component design for each site)
- A lack of time and resources for facility managers to evaluate CHP application costs and benefits
- Obstacles related to local regulations and policies for interconnection, siting, and emissions

## How FEMP Can Help

The DOE's Federal Energy Management Program (FEMP) can assist in navigating these obstacles through its ADD CHP Program. Accelerated Development and Deployment of Combined Cooling, Heating and Power at Federal Sites—ADD CHP—is FEMP's response to the needs of Federal agencies interested in CHP. FEMP offers expert, unbiased technical assistance specialized in CHP systems to any Federal agency interested in developing a CHP project. FEMP CHP services include the following:

- Site survey and feasibility verification
- Baseline data collection
- Design and technical assistance
- Fostering of partnerships between Federal agencies and private-sector project developers and financiers
- Design verification, component matching, and system sizing to thermal and power profiles
- Technical/price proposal evaluation
- Advice for addressing policy and regulator constraints — siting and permitting, grid

interconnection requirements, exit fees, backup charges

- Project facilitator guidance surrounding project development, implementation, and verification

FEMP's goal is to make maximum use of ongoing programs and partnerships to bring Federal facility managers the benefits of collaborating with the CHP industry, trade associations, energy service companies, and utilities. FEMP can help Federal facility customers address regulatory and policy barriers to CHP deployment.

## Next Steps

If you haven't yet started to look at CHP possibilities, request a quick screening from FEMP through the FEMP Web site at:

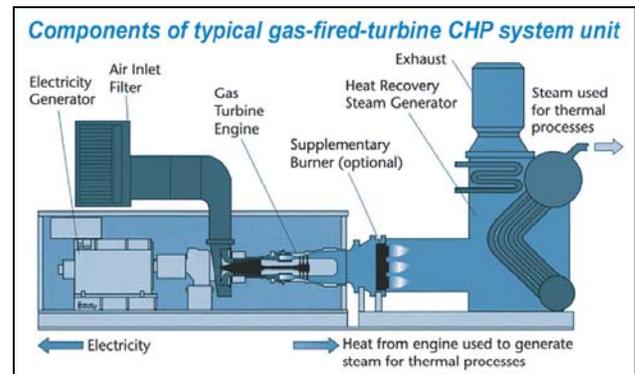
<http://www.femp.energy.gov>

If you already believe some potential exists, there are some steps you can take to better define your CHP opportunity:

- Collect and analyze electricity usage data from the utility and thermal load data to determine proper sizing of the CHP system.
- Identify any special conditions—energy security, equipment replacement, mission changes—that could affect your CHP project.
- Identify the state and local requirements for permitting a CHP plant early in the planning process.
- Identify potential impacts on utility rates under a CHP scenario—the availability, cost, and supply pressure of natural gas are issues that should be considered early in a feasibility study.
- Get reliable estimates of the costs and benefits of different CHP technologies. Be clear about your priorities and your facility's operating parameters. Performance and emissions from different CHP prime movers are well documented and can vary greatly.
- Find a private partner to help verify CHP opportunities.
- Explore the full array of alternative financing options for your facility.

As you go through these steps, you'll likely have questions or encounter roadblocks. Take advantage

of FEMP's CHP team. They can provide direct assistance or connect you with people who have worked through similar projects.



Graphic (adapted) courtesy of Solar Turbines Corp.

## Does your facility have CHP Potential?

Ideal sites will fit the following profile, but sites meeting only a few of these characteristics may also have a cost-effective CHP opportunity:

- ✓ High electric prices (> 5 cents per kilowatt-hour (kWh))
- ✓ Average electric load > 1 MW
- ✓ Ratio of average electric load to peak load > 0.7
- ✓ A central or district heating and/or cooling system in place (or a need for process heat)
- ✓ Spark spread (difference in price per MBtu between gas and electricity) > \$12
- ✓ High annual operating hours (> 6000)
- ✓ Thermal demand closely matched to electric load

Prime CHP candidates are sites with central boiler/chiller plants and district heating/cooling systems. Individual buildings are good candidates if their HVAC systems are compatible. Increasing numbers of CHP applications are becoming feasible for single buildings as energy tariffs offer strong demand-side management incentives through special rate structures and as CHP costs come down.

## FEMP Assistance

FEMP can provide expert, unbiased technical assistance to any Federal agency interested in developing a CHP project.

## Financing Mechanisms and Incentives

Federal agencies can take advantage of these alternative financing mechanisms, choosing the best fit for their project needs.

<http://www.eere.energy.gov/femp/financing/mechanisms.html>

The Database of State Incentives for Renewable Energy (DSIRE) is a comprehensive source of information on state, local, utility, and Federal incentives and policies that promote renewable energy and energy efficiency.

<http://www.dsireusa.org/>

## Who can help?

Please contact the following persons to learn more about CHP systems for your facility.

### Program Contact

Will Lintner  
Federal Energy Management Program  
202-586-3120  
[william.lintner@ee.doe.gov](mailto:william.lintner@ee.doe.gov)

### Technical Contact

Melissa Madgett  
CHP Technical Assistance  
Oak Ridge National Laboratory  
865-576-3373  
[madgettmg@ornl.gov](mailto:madgettmg@ornl.gov)

### DOE/FEMP Field Office Contacts

DOE's Field Offices process requests for technical assistance related to CHP. Learn more about field office programs by visiting <http://www.eere.energy.gov/femp/about/regionalfieldoffice.html>

## For More Information

To learn more about CHP, explore the following Web sites:

### FEMP

<http://www.femp.energy.gov>

### Oak Ridge National Laboratory FEMP

<http://www.ornl.gov/sci/ees/etsd/btrich/chp.shtml>

### United States Combined Heat and Power Association

<http://www.uschpa.org>

### EERE Information Center

1-877-337-3463

<https://www.eere.energy.gov/informationcenter/>