

## COMBINED HEAT AND POWER (CHP)

### CHP Supplies Clean and Reliable Energy

CHP is a realistic, near-term option for large energy efficiency improvements and significant CO<sub>2</sub> reductions.

CHP can reduce CO<sub>2</sub> emissions, offset imported energy, create job opportunities, and improve local economies. The adoption of CHP empowers individuals, companies, and communities by providing local energy solutions.

- Provides the reliable and affordable energy service that is required for economic growth
- Improves the resiliency of our energy infrastructure
- Operates with domestically produced and renewable fuels
- Offers businesses security against service interruptions due to natural or man-made disasters
- Provides businesses and the nation with a competitive advantage from improved energy-efficiency

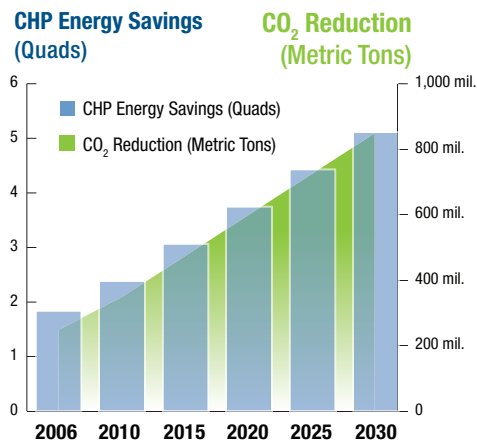
CHP stimulates the economy by utilizing local labor forces and largely domestically-produced components

### CHP Savings Potential

**240 Gigawatts** (the equivalent of 200-300 coal-fired power plants)

**5 Quads** of energy savings

**848 million metric tons** of annual CO<sub>2</sub> emissions reduction

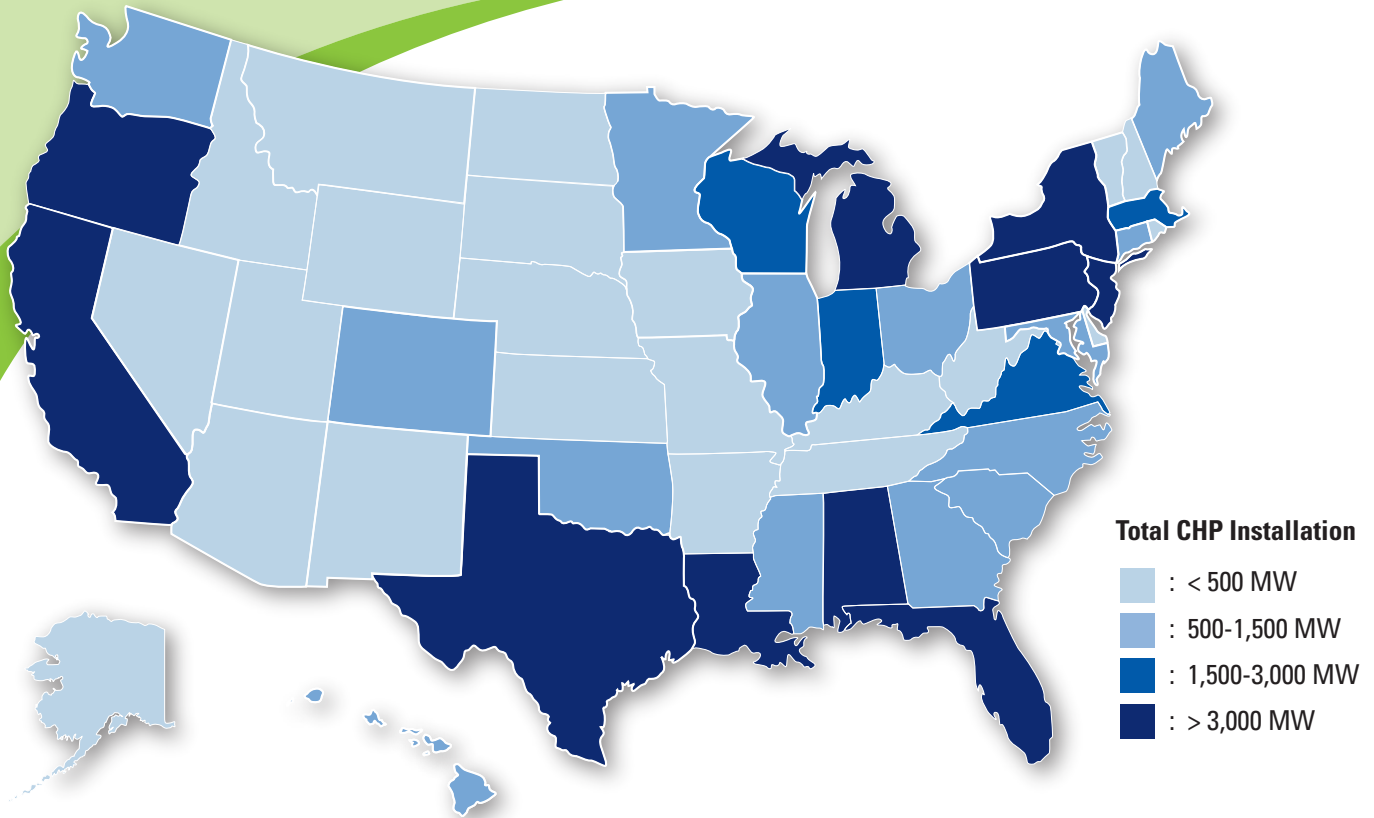


\*Based on a scenario in which 20% of generation capacity in 2030 is met with CHP



U.S. Department of Energy  
**Energy Efficiency and Renewable Energy**

Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable



**CHP Capacity State by State**

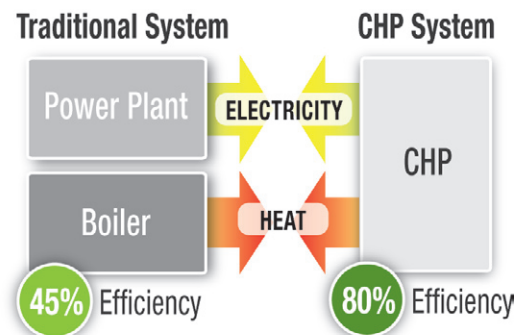
CHP is broadly applicable across the entire US. Distributed energy is often locally owned and controlled making energy consumers and communities direct stakeholders in their own energy supply.

**DOE Investments in CHP Technologies Over the Past 10 years Have Resulted in Over 85 GW of Installed CHP**

The Industrial Technologies Program (ITP), part of the Department of Energy’s Office of Energy Efficiency and Renewable Energy, is committed to researching and developing technologies that will improve national energy security, climate and environment, and economic competitiveness.

Combined Heat and Power (CHP), also known as cogeneration, is the simultaneous production of electricity and heat. Instead of purchasing power from a local utility for electricity, and then burning oil or gas in a furnace to produce heat, CHP accomplishes this in one energy-efficient step. As a result, CHP improves efficiency and reduces greenhouse gas emissions.

DOE’s investments in CHP have reduced energy consumption by the equivalent of **36 million U.S. households** and have reduced CO<sub>2</sub> emissions as much as removing over **72 million cars** from the road.



## Technology Development Goals

- Improve energy efficiency
- Develop systems that exceed the most stringent emissions regulations
- Develop systems capable of operating on renewable and waste fuels
- Demonstration of CHP systems in industrial, commercial, and institutional sites in a variety of locations throughout the US
- Validate performance and reliability

## R&D Needs

<b>Component Development</b>	<ul style="list-style-type: none"> <li>• Combustion systems to reduce emissions and enable renewable biomass/biogas fuels</li> <li>• Thermally activated technology to capture the growing market needs such as in the food processing industry and data centers</li> <li>• Heat exchanger materials development to improve overall system efficiencies and cost performance</li> </ul>
<b>Systems Development</b>	Design integrated packages that reduce costs, improve operation and streamline adoption of CHP
<b>Technology Validation</b>	<b>Full-Scale Prototype and Pre-Commercial Demonstration of</b> <ul style="list-style-type: none"> <li>• Ultra-high efficient CHP to produce systems with 85% and higher efficiencies</li> <li>• CHP system to create markets for waste gases and other waste-fuels</li> <li>• Waste Heat Recovery to create value for customers</li> </ul>

## Market Transformation and Commercialization

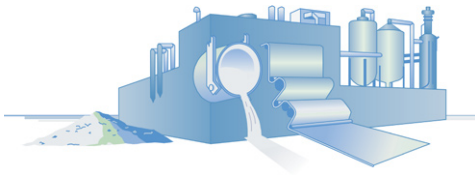
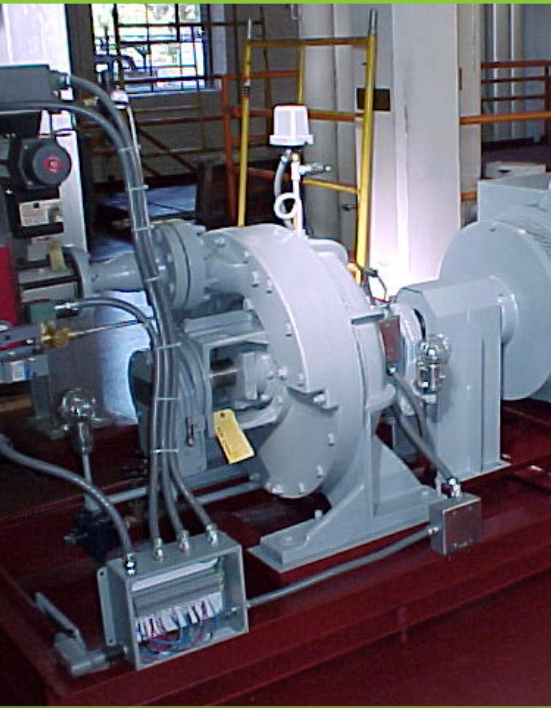
CHP is one of the few commercially available technologies in the marketplace for achieving near-term results. Much work must still be done to improve the performance and cost of the systems. Many institutional and regulatory barriers to adoption still remain.

ITP will work with local, public, and private stakeholders to:

- Address early commercialization and technical risk
- Create opportunities for systems using a variety of fuel types – natural gas, biomass, and landfill gas
- Increase public awareness through a robust commercialization and outreach campaign

The **85 GW of CHP** resulting from DOE investments has created jobs and directly benefited local economies.





## **A Strong Energy Portfolio for a Strong America**

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

### **For more information contact:**

EERE Information Center  
1-877-EERE-INF (1-877-337-3463)  
[www.eere.energy.gov](http://www.eere.energy.gov)

Visit the ITP Website at  
[www.eere.energy.gov/industry](http://www.eere.energy.gov/industry)

## **Energy Policy Legislation**

### **Energy Policy Act of 2005 (EPACT 2005)**

- Authorized increased Federal focus on distributed energy (DE) research, development, demonstration and policy support, including authorization of \$730 million for DE over the next three years
- Reaffirmed the critical role DE can play in enhancing the efficiency, reliability, security and flexibility of the Nation's energy infrastructure through solutions applied at the local level

### **Energy Independence and Security Act of 2007 (EISA 2007)**

- Will encourage increased production of clean renewable fuels, increase the efficiency of products, buildings, and vehicles, and improve the energy performance of the Federal Government
- EISA included provisions and authorizations related to CHP, waste heat recovery and distributed energy. That language included the following:
  - **TITLE IV** – Energy Savings in Buildings and Industry; Subtitle D – Industrial Energy Efficiency (Sec. 451 – Industrial Energy Efficiency)
  - **TITLE V** – Healthy High Performance Schools; Subtitle F – Institutional Entities (Sec. 471 – Energy Sustainability and Efficiency Grants and Loans for Institutions)
  - **TITLE XIII** – Smart Grid; (Sec. 1301 to 1309)