



U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy



Combined Heat and Power

MADRI Working Group Meeting

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Today

Focus: Non-tariff incentives for CHP – state and Federal

- August 30, 2012 Executive Order – *“Accelerating Investments in Industrial Energy Efficiency”*
 - CEACs / CHP TAPs
 - Critical Infrastructure
- State & Local Energy Efficiency Action Network
 - CHP Guide
- Boiler MACT Technical Assistance Effort
 - DOE Technical Assistance Program
 - Ohio Pilot Program
- Upcoming HR 6582 Report
- DOE CHP Funding Opportunities

August 30, 2012 Executive Order – “Accelerating Investments in Industrial Energy Efficiency”

Executive Order

- August 30th, 2012: President Obama signed an Executive Order to **accelerate investments in industrial energy efficiency (EE), including combined heat and power (CHP)** with the goal of bringing together all stakeholders to seize this opportunity and ensuring that Federal agencies are taking the maximal steps to support private sector investment in this space.
- The Executive Order is part of the President's efforts to both **Revitalize American Manufacturing** and to pursue an **All-of-the-Above energy strategy**
- Often **barriers exist** that prevent otherwise economic investments in industrial EE and CHP from occurring.
- The Administration believes it is important to **accelerate investment in industrial energy efficiency** in a way that **benefits all stakeholders**.

What the Executive Order Does

- Sets a national **goal of 40 GW** of new **combined heat and power** installation over the next decade;
- Directs DOE and EPA to convene stakeholders through ongoing **regional workshops to foster a national dialogue** to identify, develop, and encourage the adoption of **best practice policies and investment models**;
- Directs EPA to provide **assistance to States** on accounting for the potential emission reduction benefits of CHP and other energy efficiency policies when developing State Implementation Plans (SIPs) to achieve national ambient air quality standards;
- Directs EPA to employ **output based approaches as compliance options** in power and industrial sector regulations, as appropriate, to recognize the emissions benefits of highly efficient energy generation technologies like CHP;

What the Executive Order Does cont'd

- Directs DOE to expand participation in and create additional tools to support the **Better Buildings, Better Plants program**, which is working with companies to help them achieve a goal of reducing energy intensity by 25 percent over 10 years, as well as utilizing existing partnership programs to support energy efficiency and CHP;
- Directs all Federal agencies to support and encourage efforts to accelerate investment in industrial energy efficiency and CHP by:
 - Providing general **guidance, technical analysis and information**, and financial analysis on the value of investment in industrial energy efficiency and CHP to States, utilities, and owners and operators of industrial facilities;
 - Improving the usefulness of Federal **data collection and analysis**; and
 - Assisting **States in developing and implementing State specific best practice policies** that can accelerate investment in industrial energy efficiency and CHP.

National Goal of 40 GW of CHP by 2020

- Achieving this goal would:
 - Increase total CHP capacity in the U.S. by **50 percent** in less than a decade
 - Save energy users **\$10 billion a year** compared to current energy use
 - Save **one quadrillion Btus** (Quad) of energy — the equivalent of 1 percent of all energy use in the U.S.
 - Reduce emissions by **150 million metric tons of CO2 annually** — equivalent to the emissions from over 25 million cars
 - Result in **\$40-\$80 billion in new capital investment in manufacturing** and other U.S. facilities over the next decade

Source: DOE/EPA, CHP: A Clean Energy Solution, August, 2012,
https://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_clean_energy_solution.pdf

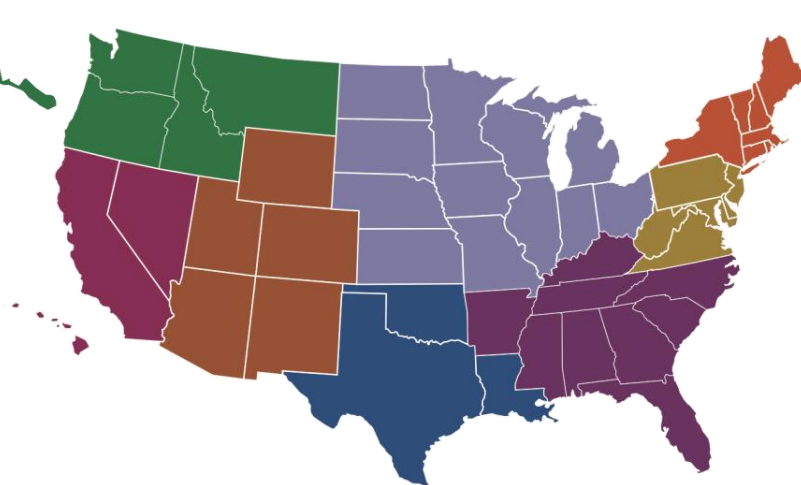
Regional Clean Energy Application Centers (CEACs)

CEAC Services:

- **Market Assessments:** Analyses of CHP market potential in diverse sectors, such as health care, industrial sites, hotels, & new commercial and institutional buildings.
- **Education and Outreach:** Providing information on the benefits and applications of CHP to state and local policy makers, regulators, energy end-users, trade associations and others.
- **Technical Assistance:** Providing technical information to energy end-users and others to help them consider if CHP makes sense for them. Includes performing site assessments, producing project feasibility studies, and providing technical and financial analyses.

FY13 FOA closed 3/8/13 for next generation CEACs – CHP Technical Assistance Partnerships (CHP TAPs)

Eight Regional CEACs & International District Energy Association



<http://www1.eere.energy.gov/manufacturing/distributedenergy/ceacs.html>

Partnering with States

- **Ohio** – Boiler MACT technical assistance
 - February 2012: PUCO adopts resolution in support of the DOE pilot and becomes the first state to participate.
 - *“Because of coal plant retirements, educating consumers on combined heat power is of particular interest to the PUCO. A facility’s decision to invest in CHP may constitute a rational market response that not only benefits the facility but which will also supports grid reliability in Ohio.”* PUCO Chairman Todd Snitchler. February 23, 2012
- **New York** – NYSERDA, Governor’s office
- **Oregon** -- Technical potential assessment of CHP in Oregon and a spreadsheet tool to help understand the impact on a CHP project of various incentives.

CEACs Partnering with States & Utilities

- SE CEAC part of working group convened by Duke in January 2012 to investigate CHP opportunities in NC.
- This working group advised Duke on examples of CHP programs in other states and on design aspects for a potential CHP incentive program.
- CEAC helped Duke identify potential pilot sites in NC from among the sites we provide CHP technical assistance to.
 - If our site assessments showed a viable CHP opportunity and interest in a utility incentive program, we obtained their permission to share their contact information with Duke.
 - From there, Duke and the sites worked together directly to evaluate whether the CHP opportunity met Duke's criteria for a pilot site.
- Duke's CHP working group has been inactive for the past 9 months, likely due to the departure of the staff who was leading it.

DOE report (ICF): **CHP: Enabling Resilient Energy Infrastructure for Critical Facilities**, March 2013

- Summarizes how critical infrastructure facilities with CHP systems operated during Superstorm Sandy.
- Several examples from other storms and blackout events in other regions of the country are also included.
- Provides information on the design and use of CHP for reliability purposes,
- Provides information on state and local policies designed to promote CHP in critical infrastructure applications.

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

CHP & State Critical Infrastructure Incentives

- **State examples:**
 - **New York:** Governor Cuomo announced \$20 million investment toward clean energy projects, specifically those aimed at providing continuous power and heat during grid outages.
 - This investment based on recommendations from NYS 2100, one of the three commissions Governor Cuomo created in the aftermath of Hurricane Sandy to improve the State's emergency preparedness and response to natural disasters.
 - **New Jersey:** Governor Christie has dedicated up to \$100 million in clean energy funds to help promote the development of CHP plants in New Jersey.

State & Local Energy Efficiency Action Network

What is the SEE Action Network?

- Network of 200+ leaders and professionals, led by state and local policymakers, bringing energy efficiency to scale
- Support on energy efficiency policy and program decision making for:
 - Utility regulators, utilities and consumer advocates
 - Legislators, governors, mayors, county officials
 - Air and energy office directors, and others
- Facilitated by DOE and EPA; successor to the National Action Plan for Energy Efficiency



To stay updated on SEE Action activities and resources, sign-up for email alerts:

<http://www1.eere.energy.gov/seeaction/index.html>

The Guide provides state policy makers with actionable information regarding:

- Design of standby rates
- Interconnection standards for CHP with no electricity export
- Excess power sales
- Clean energy portfolio standards
- Emerging market opportunities: CHP in critical infrastructure and utility participation in CHP markets

In development: State workshops w/ PUCs on the Guide & how to refine policy implementation to achieve greater CHP.



SEE Action

STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK

Guide to the Successful Implementation of State Combined Heat and Power Policies

Industrial Energy Efficiency and Combined Heat and Power Working Group

Driving Ratepayer-Funded Efficiency through Regulatory Policies Working Group

March 2013

The State and Local Energy Efficiency Action Network is a state and local effort facilitated by the federal government that helps states, utilities, and other local stakeholders take energy efficiency to scale and achieve all cost-effective energy efficiency by 2020.

Learn more at www.seeaction.energy.gov

Boiler MACT Technical Assistance Effort

Clean Air Acts Standards for Boilers and Incinerators

- On December 20, 2012, EPA finalized a specific set of adjustments to March 2011 Clean Air Act standards for boilers and certain solid waste incinerators
 - Area Source Boiler Rule
 - Major Source Boiler Rule (ICI Boiler MACT)
 - Commercial and Industrial Solid Waste Incinerators MACT
- Adjustments based on new data and additional information on real-world performance
 - Maintain public health benefits by reducing toxic air pollution, including mercury and particulates
 - Increase flexibility of compliance
 - Maintain cuts in the cost of implementation represented by March 2011 rule

CHP as a Compliance Strategy

- Compliance limits may be expensive for many coal and oil users
- May consider converting to natural gas
 - Conversion for most oil units?
 - Boiler replacements for coal units?
- May consider moving to natural gas CHP
 - Represents a productive investment
 - Potential for lower steam costs due to generating own power
 - Higher overall efficiency and reduced emissions
 - Higher capital costs, but partially offset by required compliance costs or new gas boiler costs
 - State / local / utility incentives can help
 - Natural gas CHP may be a productive investment vs. a control strategy which is

Affected Coal/Oil Boilers by Region

CEAC Region	# Coal Boilers	Coal Capacity (MMBtu/hr)	# Oil Boilers	Oil Capacity (MMBtu/hr)	Total Affected Boilers	Total Capacity (MMBtu/hr)
Gulf Coast	16	4,772.0	11	2,694.4	27	7,466.4
Intermountain	29	12,596.0	6	898.5	35	13,494.5
Mid-Atlantic	153	30,747.5	88	9,875.5	241	40,623.0
Midwest	360	84,197.1	122	15,311.3	482	99,508.4
Northeast	19	4,612.0	107	10,391.5	126	15,003.5
Northwest	23	3,238.0	23	5,066.7	46	8,304.7
Pacific	5	746.0	13	1,393.2	18	2,139.2
Southeast	186	39,710.1	164	16,981.4	350	56,691.5
Total	791	180,618.7	534	62,612.5	1,325	243,231.1

Potential CHP Capacity from Boiler MACT

Fuel Type	Number of Facilities	Number of Affected Units	Boiler Capacity (MMBtu/hr)	CHP Potential (MW)	CO ₂ Emissions Savings (MMT)
Coal	332	751	180,525	18,055	114.2
Heavy Liquid	170	367	48,296	4,830	22.9
Light Liquid	109	241	22,133	2,214	10.5
Total	611*	1,359	250,954	25,099	147.6

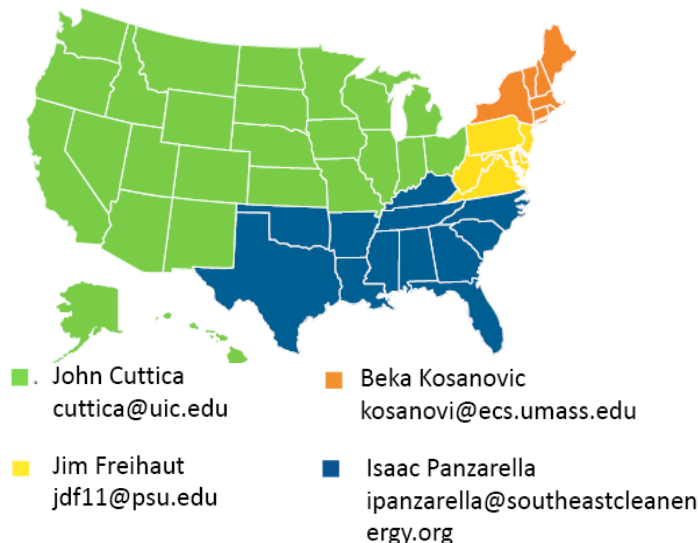
The data on this chart is continually refined

*Some facilities are listed in multiple categories due to multiple fuel types; there are 567 ICI affected facilities

- CHP potential based on average efficiency of affected boilers of 75%; Average annual load factor of 65%, and simple cycle gas turbine CHP performance (power to heat ratio = 0.7)
- GHG emissions savings based on 8000 operating hours for coal and 6000 hours for oil, with a CHP electric efficiency of 32%, and displacing average fossil fuel central station generation

DOE Boiler MACT Technical Assistance

- DOE is providing site-specific technical and cost information on clean energy compliance strategies to those major source facilities affected by the Boiler MACT rule currently burning coal or oil.
 - These facilities may have opportunities to develop compliance strategies, such as CHP, that are cleaner, more energy efficient, and that can have a positive economic return for the plant over time
- DOE Boiler MACT Technical Assistance program was piloted in Ohio starting in Feb. 2012 and is being offered nationally



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Boiler MACT Technical Assistance

Overview

On December 20, 2012, the U.S. Environmental Protection Agency (EPA) finalized the reconsideration process for its Clean Air Act pollution standards National Emissions Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters (known as Boiler Maximum Achievable Control Technology (MACT)). This rule applies to large and small boilers in a wide range of industrial facilities and institutions. The U.S. Department

stated in the final rule that existing sources will have 3 years from issuance of the final reconsideration rule to implement the new requirements, and if needed, may request an additional year.

Expected Impact on Facilities and Institutions

EPA estimates that less than 1 percent of the 1.5 million boilers in the United States would need to meet emissions limits under the reconsidered rules. EPA estimates that about 183,000 are

approximately 12 percent (about 1,650 boilers) primarily fired by coal, oil and biomass, will be required to meet specific emissions limits. These boilers using coal or oil may consider switching to natural gas as a compliance strategy and may consider natural gas combined heat and power.

Resources

*Financial Incentives Available for Facilities that are Affected by the

Results To Date: National Technical Assistance

- Preliminary Findings:
 - Over 370 companies contacted
 - 80 feel they are already in compliance
 - 62 no longer in business
 - Technical Assistance for 55 in various stages
 - All companies are now aware of how CHP can assist in a compliance strategy
 - DOE will continue to track results of results of technical assistance



Upcoming “Report on the Deployment of Industrial Energy Efficiency” to Congress (H.R. 6582)

Report on the Deployment of Industrial EE (H.R. 6582)

- *Background to the American Energy Manufacturing Technical Corrections Act (H.R. 6582) passed Dec 4, 2012*
- DOE report due in 2 years describing:
 - “The legal, regulatory, and economic barriers to the deployment of industrial energy efficiency in all electricity markets (including organized wholesale electricity markets, and regulated electricity markets).”
 - “In coordination with the industrial sector and other stakeholders, shall develop policy recommendations regarding the deployment of industrial energy efficiency, including proposed regulatory guidance to States and relevant Federal agencies to address barriers to deployment.”
- *Industrial Energy Efficiency*
 - “...improve energy efficiency or to generate or transmit electrical power and heat, ...”
 - “...including electric motor efficiency ... demand response, direct or indirect combined heat and power, and waste heat recovery.”

Report on the Deployment of Industrial EE (H.R. 6582)

(A) The legal, regulatory, and economic barriers to the deployment of industrial energy efficiency in all electricity markets (including organized wholesale electricity markets, and regulated electricity markets), including, as applicable, the following:

- (i) Transmission and distribution interconnection requirements.
- (ii) Standby, back-up, and maintenance fees (including demand ratchets).
- (iii) Exit fees.
- (iv) Life of contract demand ratchets.
- (v) Net metering.
- (vi) Calculation of avoided cost rates.
- (vii) Power purchase agreements.
- (viii) Energy market structures.
- (ix) Capacity market structures.
- (x) Other barriers as may be identified by the Secretary, in coordination with the industrial sector and other stakeholders.

Report on the Deployment of Industrial EE (H.R. 6582)

(B) Examples of—

- (i) successful State and Federal policies that resulted in greater use of industrial energy efficiency;
- (ii) successful private initiatives that resulted in greater use of industrial energy efficiency; and
- (iii) cost-effective policies used by foreign countries to foster industrial energy efficiency.

(C) Estimated economic benefits to the national economy of providing the industrial sector with Federal EE matching grants of \$5,000,000,000 for 5- and 10-year periods,

(D) The estimated energy savings available from increased use of recycled material in energy-intensive manufacturing processes.

- DOE has convened a stakeholder group to provide input and contribute to this study.
- DOE is on track to meet Congressional deadline of Dec 2014.

DOE CHP State Opportunities

- DOE Weatherization Office funded the National Governors Association *Policy Academy on Enhancing Industry Through Energy Efficiency and Combined Heat and Power*
 - Alabama, Arkansas, Illinois, Iowa, Tennessee
 - States participated to develop and implement strategic plans to improve the productivity and competitiveness of their manufacturing, assembling and processing companies.
- DOE Weatherization Office - State Energy Program 2013 Competitive Awards
 - Area of Interest 1 – *Advancing Industrial Energy Efficiency* will assist states with the development of programs and strategies that support the productivity and competitiveness of the States' industrial sectors by addressing specific policy, regulatory, or market barriers that deter a higher percentage of companies from achieving the economic and environmental benefits of greater investment in EE and CHP.
 - Awards forthcoming

DOE CHP Funding Opportunities

- DOE's **Federal Energy Management Program (FEMP)** issued a [Notice of Intent](#) (NOI) to provide grants for capital projects to Federal Agencies - (FOA) "[Assisting Federal Facilities with Energy Conservation Technologies \(AFFECT\)](#)"
- Direct funding will be provided for CHP and Renewable Energy projects.
- NOI purpose: To encourage prospective applicants to begin formulating ideas, gathering data, and developing partnerships in anticipation of the issuance of the FOA.
- Prior to FOA issuance, FEMP is making technical assistance available upon request to Federal agencies to identify and analyze CHP or renewable energy opportunities and technologies.
- FOA release tentatively scheduled Q1 FY14.

- For more information:
- <https://eere-exchange.energy.gov/Default.aspx#Foaldaq9561b2-ef44-4fe5-9318-d0295db658c5>

DOE CHP Funding Opportunities

- **DOE Loan Guarantee Office [solicitation](#) issued July 2, [Advanced Fossil Energy Projects](#)**
- Seeks applications for loan guarantees to finance projects and facilities located in the US that employ innovative and advanced fossil energy technologies that avoid, reduce, or sequester air pollutants or anthropogenic emission of greenhouse gases.
- Illustrative Types of Eligible Projects -- Efficiency Improvements:
 - A. Combined heat and power;
 - B. Waste heat recovery on industrial facilities;
- Eligible Projects include Efficiency Improvements -- Projects or facilities that incorporate new or improved technologies to increase efficiencies and substantially reduce greenhouse gas emissions associated with fossil fuel supply and use; and that meet both of the following requirements:
 - A. Projects or facilities that avoid, reduce, or sequester air pollutants or anthropogenic emission of greenhouse gases; and
 - B. Projects or facilities that employ New or Significantly Improved Technology as compared to Commercial Technology in service in the United State at the time the Term Sheet is issued.
- For more information:
- <http://lpo.energy.gov/resource-library/solicitations/advanced-fossil-energy-projects-solicitations/>
- <https://lpo.energy.gov/wp-content/uploads/2013/07/Draft-Advanced-Fossil-Solicitation.02.07.13.pdf>

For More Information

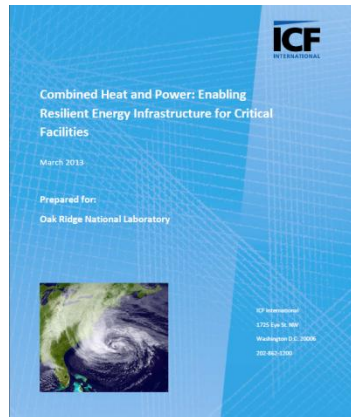
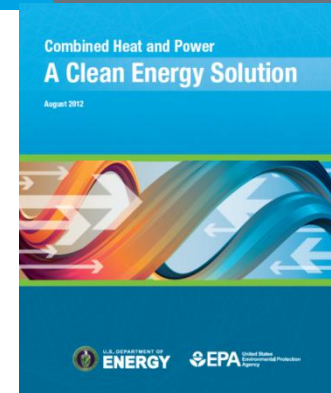
- Executive Order
<http://www.whitehouse.gov/the-press-office/2012/08/30/executive-order-accelerating-investment-industrial-energy-efficiency>
- SEE Action IEE and CHP Working Group
<http://www1.eere.energy.gov/seeaction/>
- Combined Heat & Power
<http://www1.eere.energy.gov/manufacturing/distributedenergy/index.html>
- DOE webpage on Boiler MACT Technical Assistance
<http://www1.eere.energy.gov/manufacturing/distributedenergy/boilermact.html>

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Recent CHP Reports

CHP: A Clean Energy Solution, August, 2012

Provides a foundation for national discussions on effective ways to reach the 40 GW target, and includes an overview of the key issues currently impacting CHP deployment and the factors that need to be considered by stakeholders participating in the dialogue.



CHP: Enabling Resilient Energy Infrastructure for Critical Facilities, March 2013

This report summarizes how critical infrastructure facilities with CHP systems operated during Superstorm Sandy. Several examples from other storms and blackout events in other regions of the country are also included. The report provides information on the design and use of CHP for reliability purposes, as well as state and local policies designed to promote CHP in critical infrastructure applications.

Guide to the Successful Implementation of State CHP Policies, March 2013

Informs state utility regulators and other state policymakers with actionable information to assist them in implementing key state policies that impact CHP.

- Design of standby rates
- Interconnection standards for CHP with no electricity export
- Excess power sales
- Clean energy portfolio standards (CEPS)
- Emerging market opportunities—CHP in critical infrastructure and utility participation in CHP

