



U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

Climate Policy Initiative Dialogue Meeting

October 18-19, 2012

Washington, DC

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Today's Outline

- DOE Activities in Support of Executive Order 13624 - *Accelerating Investments in Industrial Energy Efficiency*
 - Regional Industrial Energy Efficiency & Combined Heat and Power Dialogue Meetings
 - Better Buildings, Better Plants
 - “CHP as a Clean Energy Resource” new report
 - State technical assistance
- Focus on Ohio
 - DOE's CHP Activities in Ohio
 - Role of Public Commission of Ohio
 - DOE connection to Ohio SB 315
 - Ohio Coalition for Combined Heat and Power

DOE Activities in Support of Executive Order

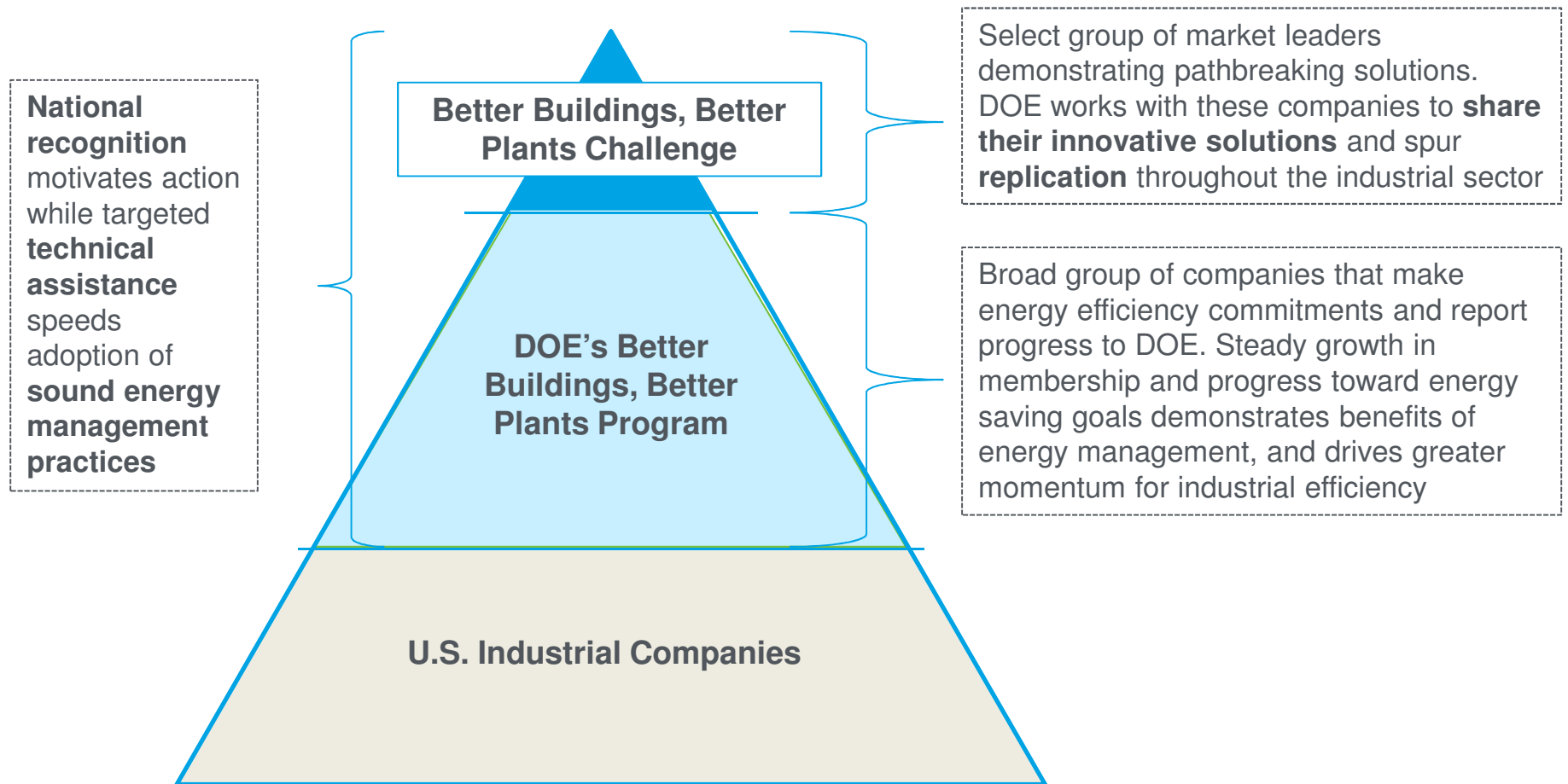
- Regional Industrial Energy Efficiency & Combined Heat and Power Dialogue Meetings
- Better Buildings, Better Plants
- “CHP as a Clean Energy Resource” new report
- State technical assistance

DOE Regional Dialogue Meetings

- Upcoming DOE Regional Industrial Energy Efficiency & Combined Heat and Power Regional Dialogue Meetings
 - In-person, one day dialogue meetings that focus on developing and implementing state best practice policies and investment models that address the multiple barriers to greater investment in industrial energy efficiency and combined heat and power (CHP).
- **Southeast** Industrial Energy Efficiency & Combined Heat and Power Regional Dialogue Meeting
- January 24, 2013, Little Rock, Arkansas
http://www1.eere.energy.gov/manufacturing/newsandevents/events_detail.html?event_id=7304
- **Northeast / Mid-Atlantic** Industrial Energy Efficiency & Combined Heat and Power Regional Dialogue Meeting
- March 13, 2013, Baltimore, Maryland
http://www1.eere.energy.gov/manufacturing/newsandevents/events_detail.html?event_id=7305

Better Buildings, Better Plants Program & Challenge

The Better Buildings, Better Plants Program & Challenge are complementary initiatives that advance energy efficiency in the industrial sector in support of the President's goal of helping manufacturers save \$100 billion in energy bills over the next decade



Better Buildings, Better Plants

- All companies participating in Better Buildings, Better Plants commit to improving the energy efficiency of their U.S. manufacturing operations by 25% over 10 years.
 - On an annualized basis, goal is equivalent to about double the projected BAU rate for the entire U.S. industrial sector.
- Over 100 companies participating in the Better Plants Program; ten involved in the Better Plants Challenge.
- Together, these companies represent over 1,400 plants and more than 5% of the total U.S. manufacturing energy footprint.
- Since 2010, partners in the Better Plants program have cumulatively saved about 45 trillion BTUs, and \$240 million.

For more information:

Andre DeFontaine, 202-586-6585, Andre.Defontaine@ee.doe.gov

http://www1.eere.energy.gov/manufacturing/tech_deployment/betterplants/index.html

New DOE / EPA CHP Report

- “Combined Heat and Power: A Clean Energy Solution” – DOE / EPA report in support of the Executive Order & national CHP challenge goal
- Achieving the 40 GW of new CHP 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
 - Result in \$40 - \$80 billion in new capital investment in manufacturing and other U.S. facilities over the next decade
 - Save one quadrillion (Quad) Btu’s of energy, equal to 10^{15} Btu - the equivalent of 1 percent of all energy use in the U.S.
 - Reduce emissions by 150 million metric tons of CO₂ annually - the equivalent to the emissions produced from over 25 million cars

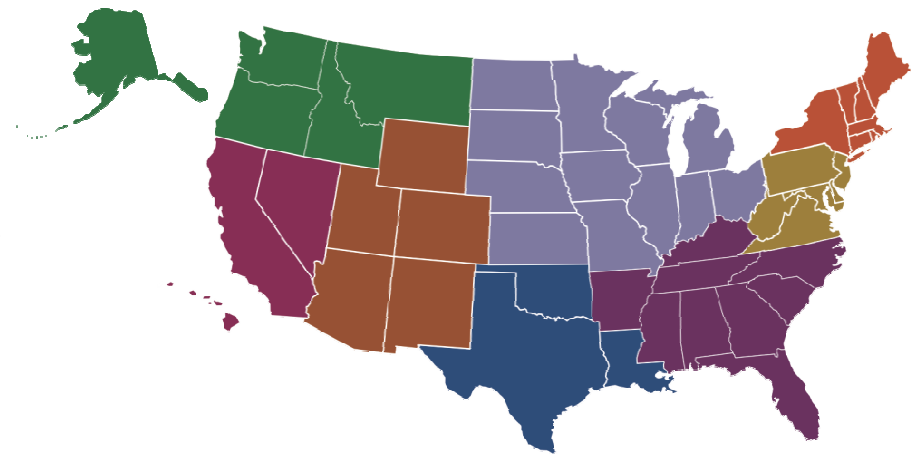
DOE State Technical Assistance

- Significant opportunity for DOE to support states efforts to address state and local barriers to accelerate investment in Industrial EE and CHP.
- DOE is working closely with the State of Ohio, providing a host of state-specific technical assistance, including piloting Boiler MACT technical assistance effort and supporting the Public Utilities Commission of Ohio as they consider opportunities to remove barriers and raise awareness of CHP.
- Opportunities for states that want to partner with DOE, identify opportunities at the state level, and develop best practices that can be implemented around the country.

DOE CHP Assistance: Regional Clean Energy Application Centers (CEACs)

Eight Regional CEACs & International District Energy Association

- **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.



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

For More Information on DOE's Efforts Supporting the EO

- Contact Katrina Pielli, katrina.pielli@ee.doe.gov, 202-287-5850. Lead for DOE's efforts in support of the Executive Order.
- **Executive Order:** <http://www.whitehouse.gov/the-press-office/2012/08/30/executive-order-accelerating-investment-industrial-energy-efficiency>
- **Regional Industrial EE and CHP Dialogue Meetings:** <http://www1.eere.energy.gov/manufacturing/newsandevents/events.html>
- **Better Buildings, Better Plants:** http://www1.eere.energy.gov/manufacturing/tech_deployment/betterplants/index.html
- **New Report, “Combined Heat and Power: A Clean Energy Resource”:** http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_clean_energy_solution.pdf

Focus on Ohio

- DOE's CHP activities in Ohio
 - Role of Clean Energy Application Center
 - DOE Boiler MACT Technical Assistance pilot
- Role of Public Utility Commission of Ohio
- DOE connection to Ohio SB 315
- Ohio Coalition for Combined Heat and Power

Ohio CHP Installation Status/Opportunity

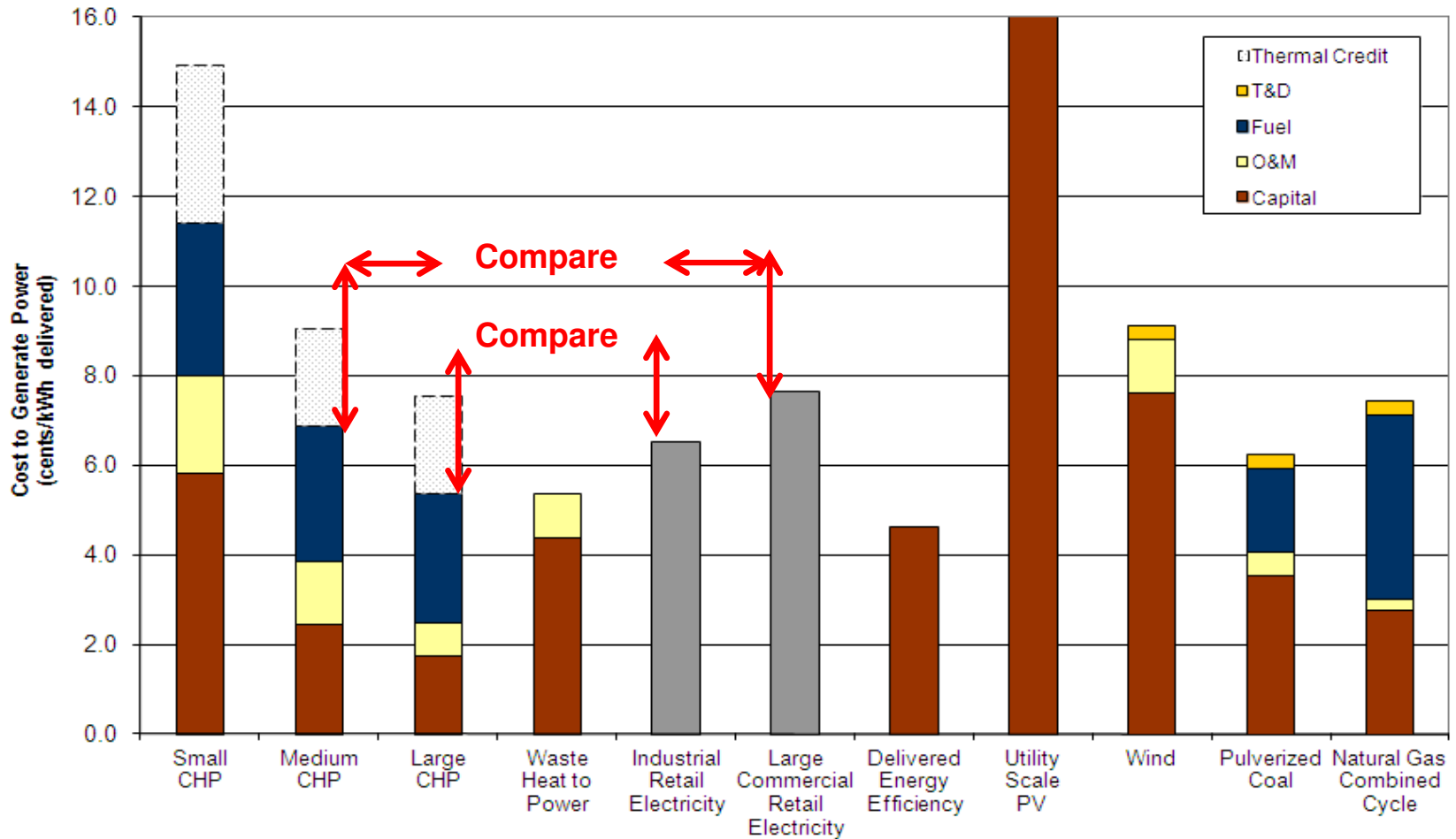
| | Current | Potential |
|---|----------|-----------|
| CHP Implementation in Ohio | 521.2 MW | 9,800 MW |
| CHP % of Total Ohio Electric Generation | 1.6% | 29.4% |
| Nationally, CHP % of Total Generation | 8.0% | - |

| Market Sector | Gen. Potential (MW) |
|--------------------------|---------------------|
| Paper | 2,329 |
| Chemicals | 2,838 |
| Primary Metals | 430 |
| Food | 310 |
| Other Industrial | 767 |
| Commercial/Institutional | 3,082 |
| Total | 9,800 |



CHP Represents a Cost-Effective Electricity Resource in Ohio

Cost of Delivered Electricity - Ohio



CHP thermal credit reflects the cost of boiler fuel avoided by capturing and using the waste heat from CHP

Midwest CEAC Activity Overview in Ohio

- Current circumstances have highlighted the role additional CHP can play in the Ohio energy resource mix & achieve benefits
 - Coal power plant retirement announcements, energy mix changing
 - Boiler MACT opportunity for new CHP
 - Focus on maintaining and increasing Ohio manufacturing
- DOE will be providing site-specific technical and cost information on clean energy compliance strategies to those major source facilities affected by the EPA Boiler MACT rule currently burning coal or oil.
 - Opportunities to develop compliance strategies, such as CHP, that are cleaner, more efficient, and have a positive economic return for the plant
- DOE Boiler MACT Technical Assistance program is being piloted in Ohio now, and will be rolled out nationally when the EPA rule reconsideration process is complete.
- CEACs can/have provide(d) non-bias educational information to inform state policy decisions, such as Ohio SB 315

Impacts of the Boiler MACT (reconsidered proposal)

- Compliance straight forward for natural gas fired units (tune-ups in lieu of more rigorous control options)
- Rule significantly impacts oil, coal and biomass boilers and process gas boilers
 - Controls potentially required for Hg, PM, HCl and CO
 - Emissions limits must be met at all times except for start-up and shutdown periods
 - Also includes monitoring and reporting requirements
- Limits difficult, technically and economically, for oil and coal units - some may consider switching to natural gas
 - Potential opportunity for natural gas CHP:
 - Trade off of benefits and additional costs
 - Economics now based on incremental investment over compliance costs

CHP as a Compliance Strategy

- Compliance with limits will be expensive for many coal and oil users
- May consider converting to natural gas
 - Conversion for most oil units?
 - New boilers for some 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

Potential CHP Capacity

| 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 still being 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

MACT Affected Boilers in Ohio

| Fuel Type | Number of Units | Capacity (MMBtu/hr) |
|--------------|-----------------|---------------------|
| Coal | 48 | 10,015 |
| Heavy Liquid | 6 | 743 |
| Light Liquid | 16 | 5,112 |
| Biomass | 7 | 1,448 |
| Process Gas | 6 | <u>2,003</u> |
| Total | 83 | 19,321 |

Includes industrial, commercial and institutional boilers only
from publicly available EPA ICR database

DOE Boiler MACT Approach

- Site-specific “Decision Trees” will include:
 - Facility Info
 - Site Financial Data
 - Contact Info
 - Boiler Unit Data
 - Compliance Control Requirements
 - CHP as an Alternative Compliance Option
 - Comparative Cost of Compliance Options
 - CHP Payback
 - Available Financial Options

Update on Boiler MACT Technical Assistance

- Findings of Midwest CEAC
 - Several facilities/boilers already under compliance (measures already taken)
 - Several facilities working with Midwest CEAC to explore opportunities
 - Several facilities working with engineering firms to explore opportunities
 - Several facilities waiting for final ruling of Boiler MACT
 - Some EPA ICR identified facilities/plants shut down (primarily due to economy/recession)

Role of Utility Commission (PUCO)

“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.”

- Public Utilities Commission of Ohio (PUCO) Chairman Todd Snitchler. February 23, 2012

PUCO Resolution passed February 22, 2012 supporting the DOE Boiler MACT technical assistance effort being piloted in Ohio

<http://www.puco.ohio.gov/puco/index.cfm/industry-information/industry-topics/combined-heat-and-power-in-ohio/www.puco.ohio.gov/puco/?LinkServID=EE08638F-C000-C2CA-E4D77686612C5744>

Role of Utility Commission (PUCO) (2)

- PUCO conducted a series of CHP workshops as part of the DOE pilot to help industrial boiler owners and operators learn about options to meet changing environmental standards.
- Initiative intended to remove educational and regulatory barriers to CHP development in Ohio and across the nation.
- Archived workshops with presentations/video available for download:
 - **CHP 101 Workshop – March 9, 2012**
 - **CHP Case Studies: Voices of Experience Workshop – June 20, 2012**
 - **Financial Tools for CHP Development - August 2, 2012**
 - **CHP & Stand-by Power - September 13, 2012**

For more information on the PUCO CHP initiative visit:

<http://www.puco.ohio.gov/puco/index.cfm/industry-information/industry-topics/combined-heat-and-power-in-ohio/>

DOE Boiler MACT Assistance Available

- DOE webpage on Boiler MACT Technical Assistance:
<http://www1.eere.energy.gov/manufacturing/distributedenergy/boilermact.html>
 - DOE Boiler MACT Technical Assistance Fact Sheet:
http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/boilermact_tech_asst_factsheet.pdf
- List of available state incentives for emissions controls, EE measures, boiler replacements/tune-ups, CHP, and energy assessments (DOE)
 - http://www1.eere.energy.gov/industry/states/pdfs/incentives_boiler_mact.pdf
 - Will be updated when rule is final
- Extensive assistance materials for Area Source rule available from EPA
 - Tune-up guidance, fast facts, brochure, table of requirements, small entity compliance guide, etc.
 - www.epa.gov/ttn/atw/boiler/boilerpg.html

For More Information on DOE Boiler MACT Technical Assistance

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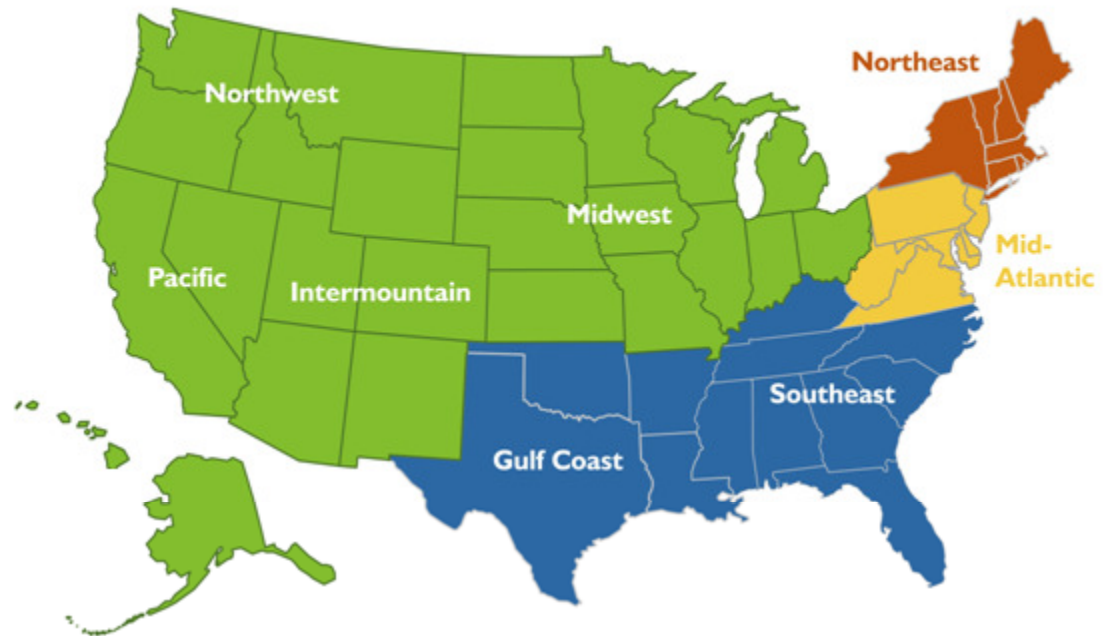
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DOE Boiler MACT Technical Assistance:

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


DOE Boiler MACT Technical Assistance Fact Sheet:

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



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Ohio Senate Bill 315

- Introduced in March, 2012 as result of Gov. Kasich's "21st Century Energy Plan"
- Includes amendments to SB 221's RPS and EERS provisions
- Signed into law: June 11, 2012
- Effective date of legislation: September 10, 2012



Ohio Senate Bill 315 (2)

- Waste Energy Recovery (WER) systems and CHP now qualify as energy efficiency measures under the EERS
- WER systems now qualify as renewable energy under the RPS
- PUCO will develop rules pertaining to their sections of the bill
- Rules to be filed with Joint Committee of Agency Rule Review (JCARR) after the effective date of the legislation
- Individual utility programs will likely determine: revenue mechanisms for savings-per-kilo/megawatt-hour – rebates, performance payments, subsidize equipment, etc.

Ohio Coalition for Combined Heat and Power (OCCHP)

- initiated December 2010 at Industrial Energy Consumers of American Workshop on Ohio's CHP potential
- Volunteer coalition of business interests that supports clean, energy-efficient CHP and WER technology applications in industrial, commercial and institutional settings
- Active in education and discussions of CHP/WER leading up to passing of SB 315

For more information on OCCHP:

www.midwestcleanenergy.org/ohiochp



Additional Supporting Slides / Background Information

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
- Since the beginning of 2010, the U.S. manufacturing sector has added over 500,000 jobs - the first sustained job growth in the sector since the 1990s.
- 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 Is the Urgency?

- Investments in industrial energy efficiency, including combined heat and power, offer significant benefits to manufacturers, utilities and communities across the country, including:
 - *Improving U.S. manufacturing competitiveness*
 - By accelerating these investments, manufacturers could save at least \$100 billion in energy costs over the next decade;
 - *Creating jobs now through investments upgrading our manufacturing facilities*
 - Meeting the goal of 40 GW of new CHP over the next decade would mean \$40 to \$80 billion of new capital investment in American manufacturing facilities. Most of these efficient technologies are made in the U.S.;
 - *Offering a low-cost approach to new electricity generation capacity to meet current and future demand*
 - Investments in IEE, including CHP, cost as much as 50% less than traditional forms of delivered new baseload power.
 - *Significantly lowering emissions*
 - Improved efficiency can meaningfully reduce nationwide GHG emissions and other criteria pollutants; and
 - *Enhancing grid security*
 - Investments in industrial energy efficiency reduce the need for new electricity infrastructure (transmission and distribution) and improve overall electric reliability.

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.

EPA Boiler MACT Background

- Dec 2, 2011: EPA released proposed amendments to previously released rules setting air toxic standards for boilers, process heaters and certain solid waste incinerators (CIWSI) incinerators.
 - EPA initially issued final rules for these units in March 2011, setting standards intended to cut emissions of hazardous air pollutants (HAPs) such as mercury, dioxin and lead.
 - At the same time it issued the final rules in March, EPA also announced that it intended to reconsider those standards under a Clean Air Act process that allows the agency to seek additional public review and comment to ensure full transparency in its rulemaking.
- Three rules:
 - Proposed Emissions Standards for **Area** Source Industrial, Commercial, and Institutional Boilers
 - Proposed Emissions Standards for **Major** Source Industrial, Commercial, and Institutional Boilers and Process Heaters
 - Proposed Emissions Standards for **Commercial/Industrial Solid Waste Incinerators** (CISWI)
- DOE's effort focused on **Major Source** rule

EPA Boiler MACT (2)

- Standards for hazardous air pollutants from major sources: industrial, commercial and institutional boilers and process heaters (excludes any unit combusting solid waste)
- Major source is a facility that emits:
 - 10 tpy or more of any single Hazardous Air Pollutant, or 25 tpy or more of total Hazardous Air Pollutants (HAPs)
- Emissions limits applicable to new and existing units > 10 MMBtu/hr
 - Mercury (Hg)
 - Particulate Matter (PM) as a surrogate for non-mercury metals (alternative limits for total selective metals (TSM))
 - Hydrogen Chloride (HCl) as a surrogate for acid gases
 - Carbon Monoxide (CO) as a surrogate for non-dioxin organics

DOE Boiler MACT Technical Assistance

- DOE currently provides technical information and assistance, market development, and education on CHP, Waste Heat to Power, and District Energy options through its 8 regional Clean Energy Application Centers (CEACs)
- DOE is supplementing this ongoing effort by 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 is being piloted in Ohio now, and will be rolled out nationally when the EPA rule reconsideration process is complete