

# Jumpstarting combined heat and power initiatives in the US

*Webinar Series for Industrial Excellence*

*Bruce Hedman, Katrina Pielli, Dwayne Breger, Michael Worden*  
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Sharing best practices for the low carbon future



Sharing best practices for the low carbon future | [iipnetwork.org](http://iipnetwork.org)

# Agenda

1. Bruce Hedman: Setting the scene
2. Katrina Pielli: Federal policies and actions to support CHP
3. Dwayne Breger: Mass Save Energy Efficiency incentives and the Alternative Portfolio Standard
4. Michael Worden: NY's efforts to promote CHP for grid resiliency and reliability
5. Panel discussion/Q&A

Sharing best practices for the low carbon future



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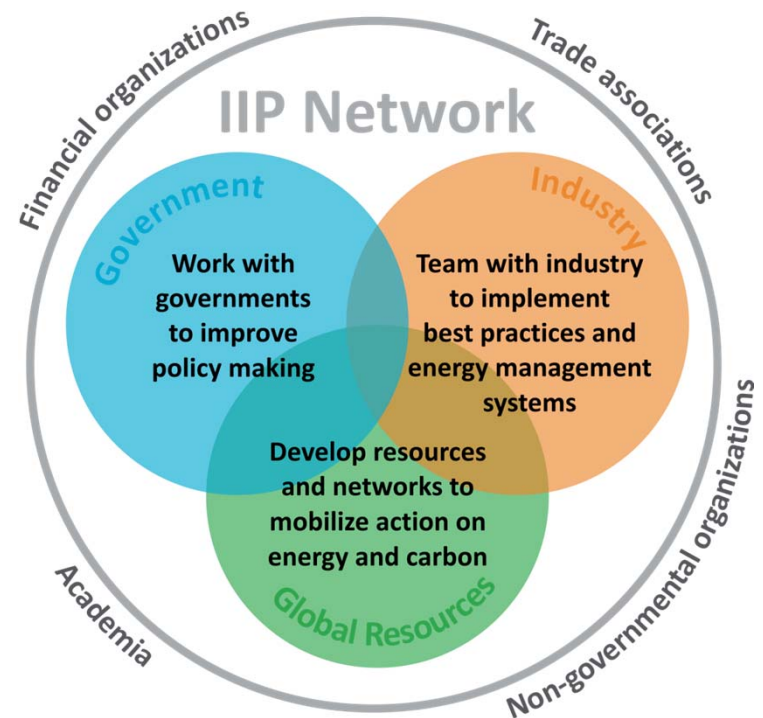
# Setting the scene

Bruce Hedman  
Technical Director  
Institute for Industrial Productivity

# About the Institute for Industrial Productivity

IIP provides industry and governments with the best energy efficiency practices to reduce energy costs and prepare for a low carbon future.

- Sharing best practices, including policy experience, and providing access to a network of international experts.
- Developing original research, analysis and databases.
- Bridging the gap between government policy and industry implementation.



# What Is Combined Heat and Power?

CHP is an *integrated energy system* that:

- Is located at or near a factory or building
- Generates electrical and/or mechanical power
- Recovers waste heat for
  - heating,
  - cooling or
  - dehumidification
- Can utilize a variety of technologies and fuels

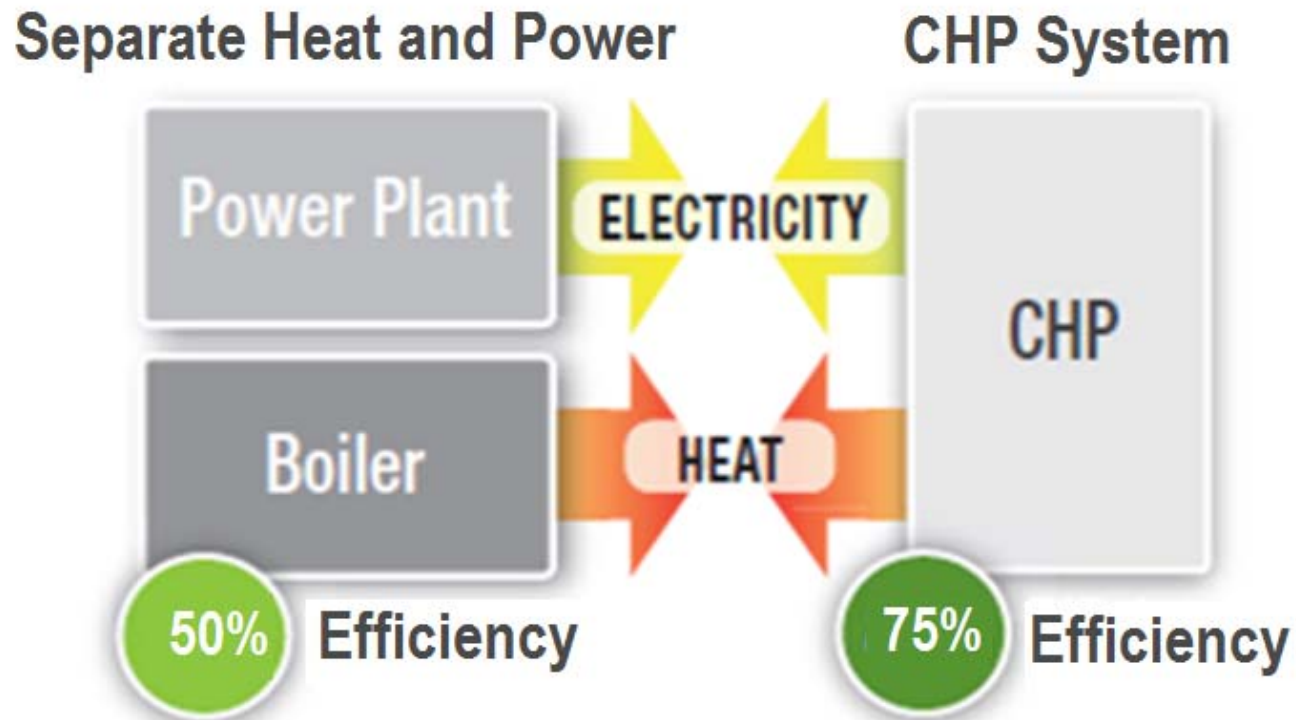


## What Are the Benefits of CHP?

- **User** - Reduced energy costs and improved power reliability
- **Environment** – Reduced energy use and lower emissions (greenhouse gases, NOx, SOx, CO and PM)
- **Public Safety** – Keep critical infrastructure operating and support the grid in times of emergency



# Efficiency Benefits of CHP



Source: Oak Ridge National Laboratory

# CHP Value Proposition

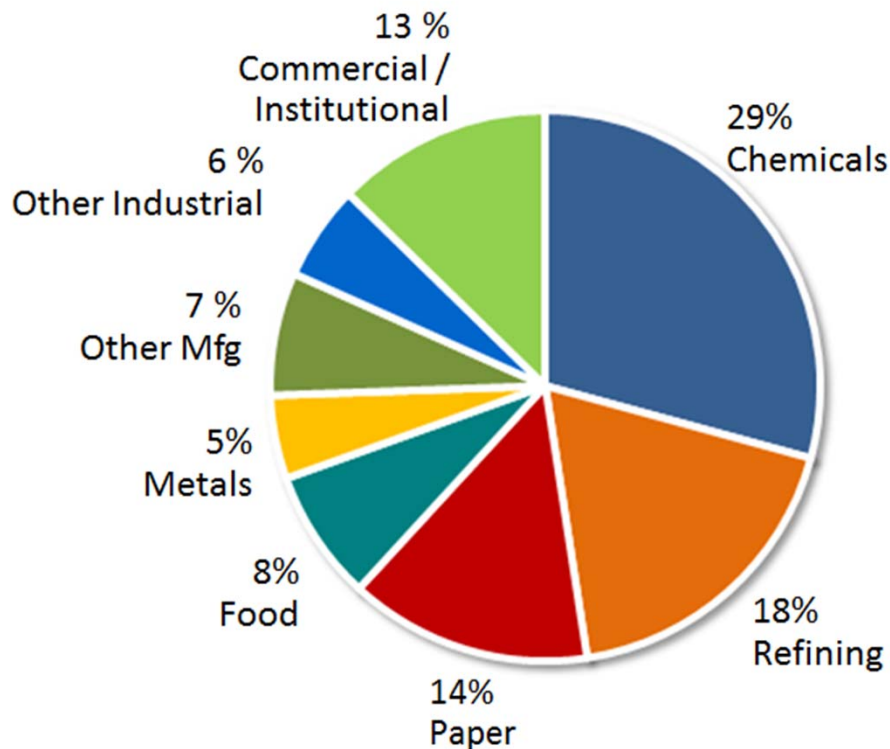
Category	10 MW CHP	10 MW PV	10 MW Wind
Annual Capacity Factor	85%	22%	34%
Annual Electricity	74,446 MWh	19,272 MWh	29,784 MWh
Annual Useful Heat	103,417 MWh <sub>t</sub>	None	None
Footprint Required	6,000 sq ft	1,740,000 sq ft	76,000 sq ft
Capital Cost	\$20 million	\$45 million	\$24 million
Annual Energy Savings	316,218 MMBtu	198,563 MMBtu	306,871 MMBtu
Annual CO <sub>2</sub> Saving	42,506 Tons	17,824 Tons	27,546 Tons

Source: *CHP: A Clean Energy Solution*; US DOE and EPA, 2012

Based on: 10 MW Gas Turbine CHP - 28% electric efficiency, 68% total efficiency  
 Displaces National All Fossil Average Generation (eGRID 2010) -  
 9,720 Btu/kWh, 1,745 lbs CO<sub>2</sub>/MWh, 6% T&D losses



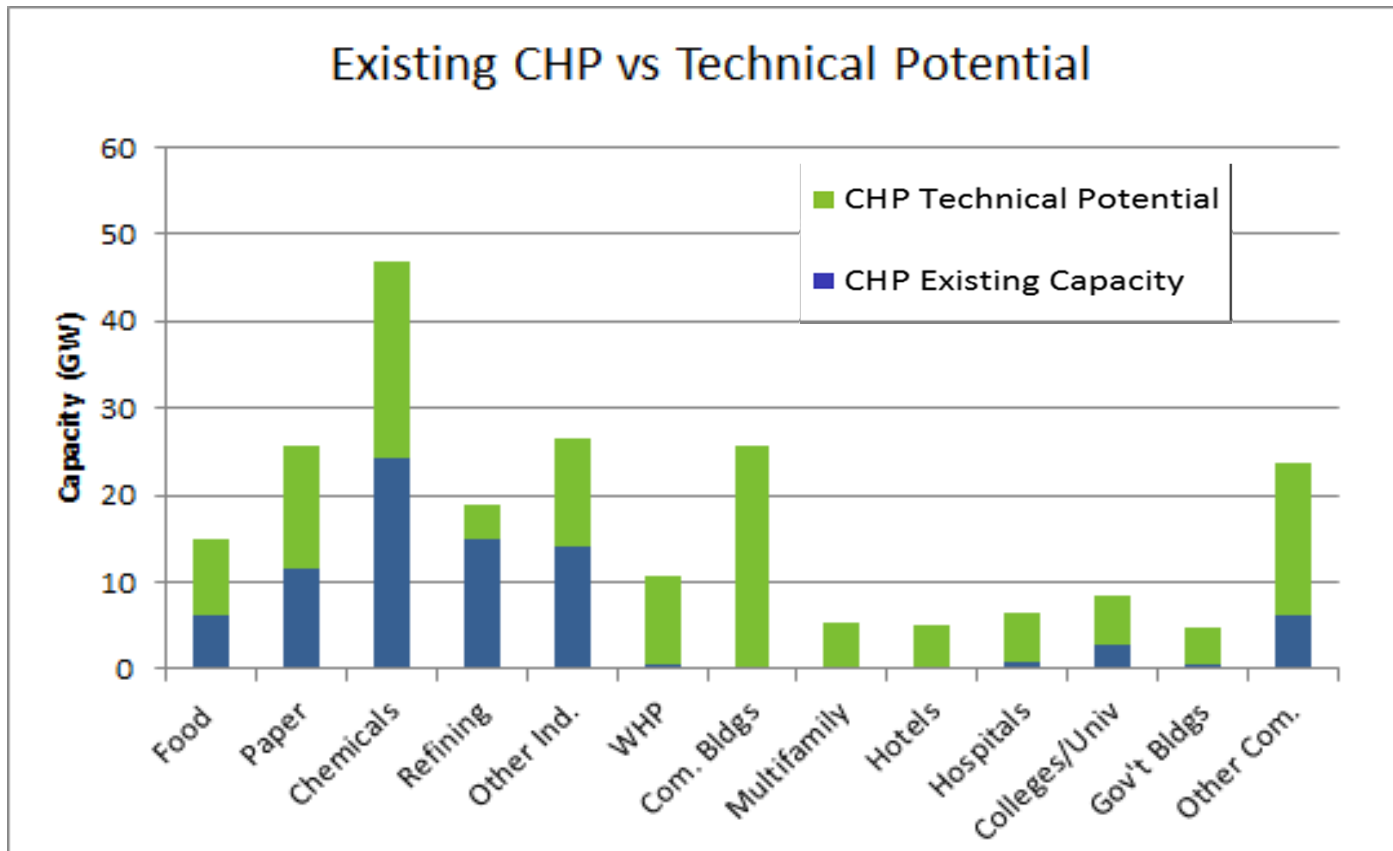
# CHP: An Important U.S. Energy Resource



Source: ICF CHP Installation Database (2012 data)

- **82.4 GW** of installed CHP at 4,200 industrial and commercial facilities (2012)
- 87% of capacity in industrial applications
- 70% of capacity is natural gas fired
- Avoids more than **1.8 quadrillion Btus** of fuel consumption annually
- Avoids **241 million metric tons of CO<sub>2</sub>** compared to separate production

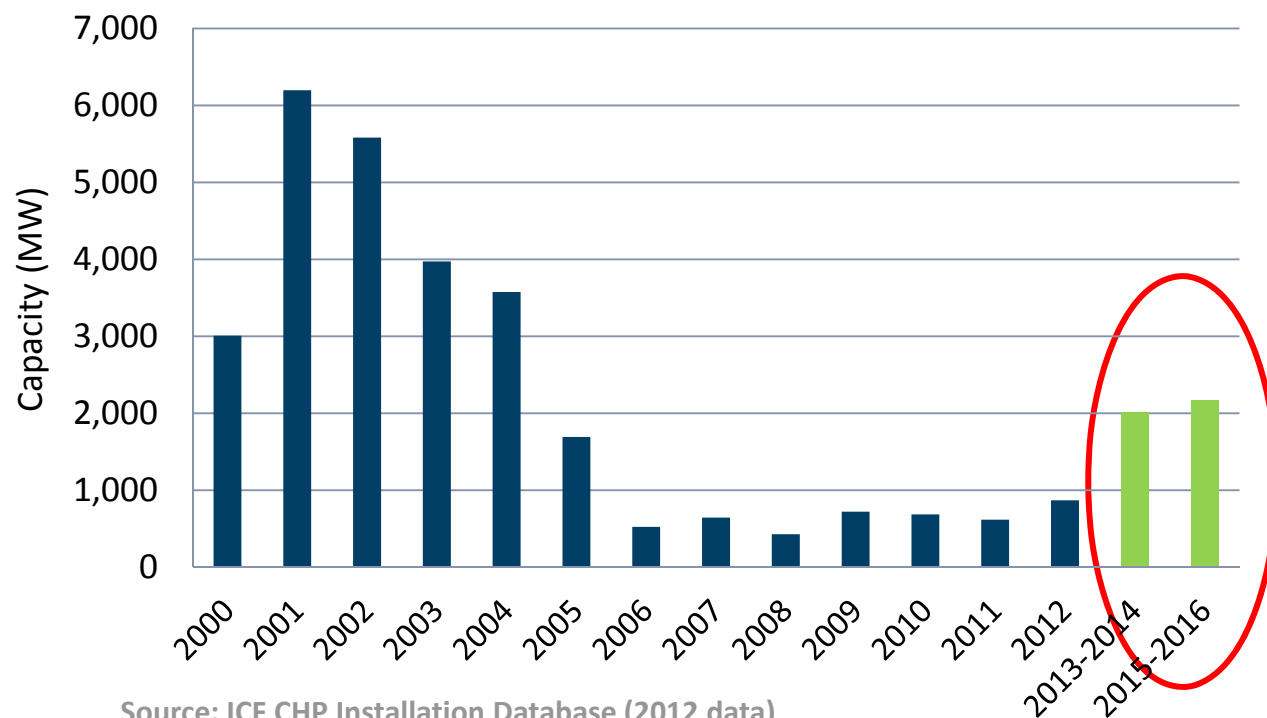
# The Potential for Additional CHP



Source: *CHP: A Clean Energy Solution*; US DOE and EPA, 2012

# Emerging CHP Market Drivers

- Changing natural gas outlook
- Growing recognition of CHP benefits by state and federal policymakers
- Opportunities created by:
  - ✓ Environmental pressures
  - ✓ Growing interest in grid resiliency



Source: ICF CHP Installation Database (2012 data)

Over 4,000 MW announced/under construction

## Hurdles to Expanded Use of CHP

- Financial uncertainty
- CHP cost and performance uncertainty
- Regulatory uncertainty
- Utility uncertainty