

# Industrial Combined Heat and Power: Why is it Stalled in the U.S.?

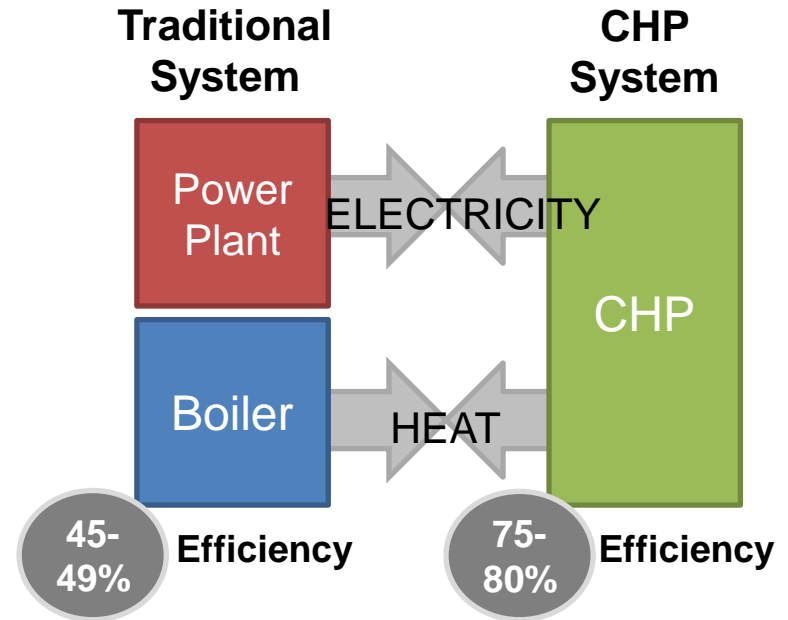
**Marilyn Brown**  
**Professor of Energy Policy**  
**Georgia Institute of Technology**

**Clean Energy Seminar**  
**Georgia Tech**  
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# Numerous Market Failures and Barriers Inhibit the Growth of Industrial CHP

- **Key strengths**
  - Waste heat recycling=free fuel and high efficiency\*
  - Low-cost & clean energy
  - Enhances system reliability
- **Numerous barriers to CHP investments**
  - Regulatory barriers
    - CHP cuts utility profits
  - Financial barriers
  - Information and workforce barriers



Source: Shipley et al. (2008) and Brown et al. (2011)

\*Central generation cannot economically recycle waste heat because steam, hot or chilled water travel at most  $\approx 5$  miles.

**Policy options are available to tackle these barriers.**

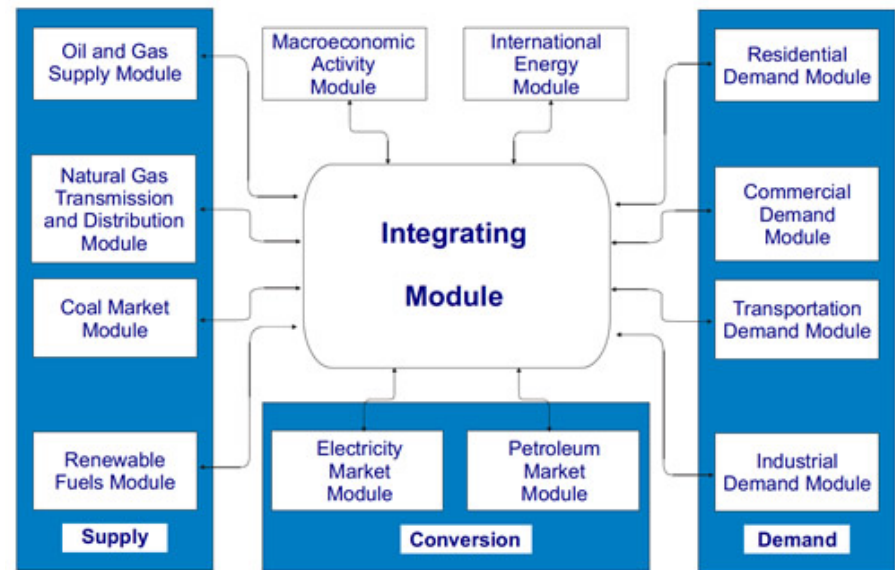
# Some Recent Policies: A CHP Goal, a Tax Credit, State Portfolio Standards, and DOE Technical Assistance

- The U.S. has about 84 GW of CHP capacity (about 12% of power generation); the vast majority is in the industrial sector.
- In August 2012, an executive order set a national goal of **40 GW of new industrial CHP by 2020**.
- The Energy Information Administration forecasts that the nation will meet only **about half** of this goal by 2020.
- Baer, Brown and Kim (2013) estimate that a 30% Investment tax credit (ITC) **would meet the goal** in 2023, and would create jobs.\*

\* Baer, P., M.A. Brown and G. Kim. (2013). "The Job Generation Impacts of Expanding Industrial Cogeneration," Georgia Institute of Technology School of Public Policy, Working Paper #76. Available at <http://www.spp.gatech.edu/aboutus/workingpapers>

# Methodology for Estimating Job Impacts: Hybrid NEMS-Input/Output Model

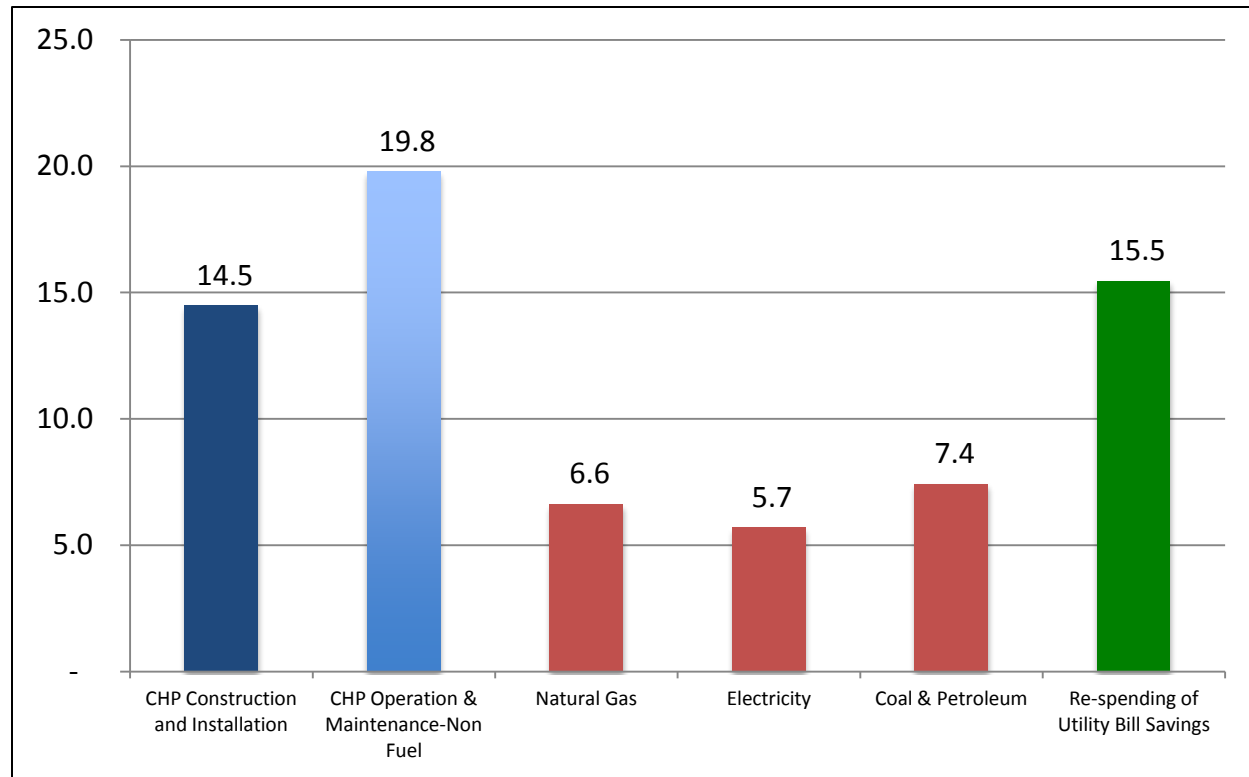
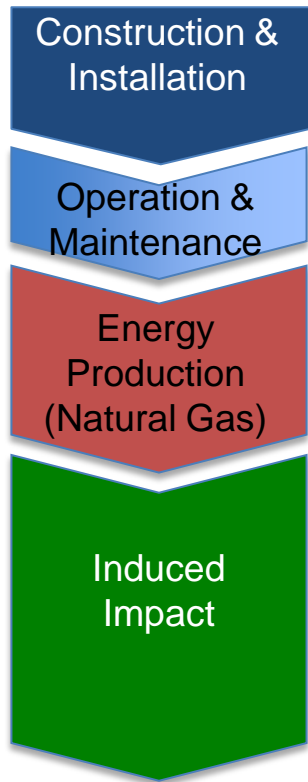
- We first modeled the investment tax credit in Georgia Tech's National Energy Modeling System (GT-NEMS).
- NEMS outputs (capacity, supply, & energy bill changes) drive input-output multipliers (based on IMPLAN) to estimate employment impacts.



**National Energy Modeling System**  
(Source: EIA 2009)

Marilyn A. Brown, Matt Cox, and Paul Baer. 2013. "Reviving manufacturing with a federal cogeneration policy." *Energy Policy*. 52 (2013) 264–276.

# The Job Generation Benefits of Expanding Industrial Cogeneration



## Job Coefficients by Sector (Jobs per Million of Expenditures, in \$2009)

Each GW of installed CHP capacity creates and maintains  $\approx$ 2,000-3,000 full-time equivalent jobs throughout the lifetime of the system.

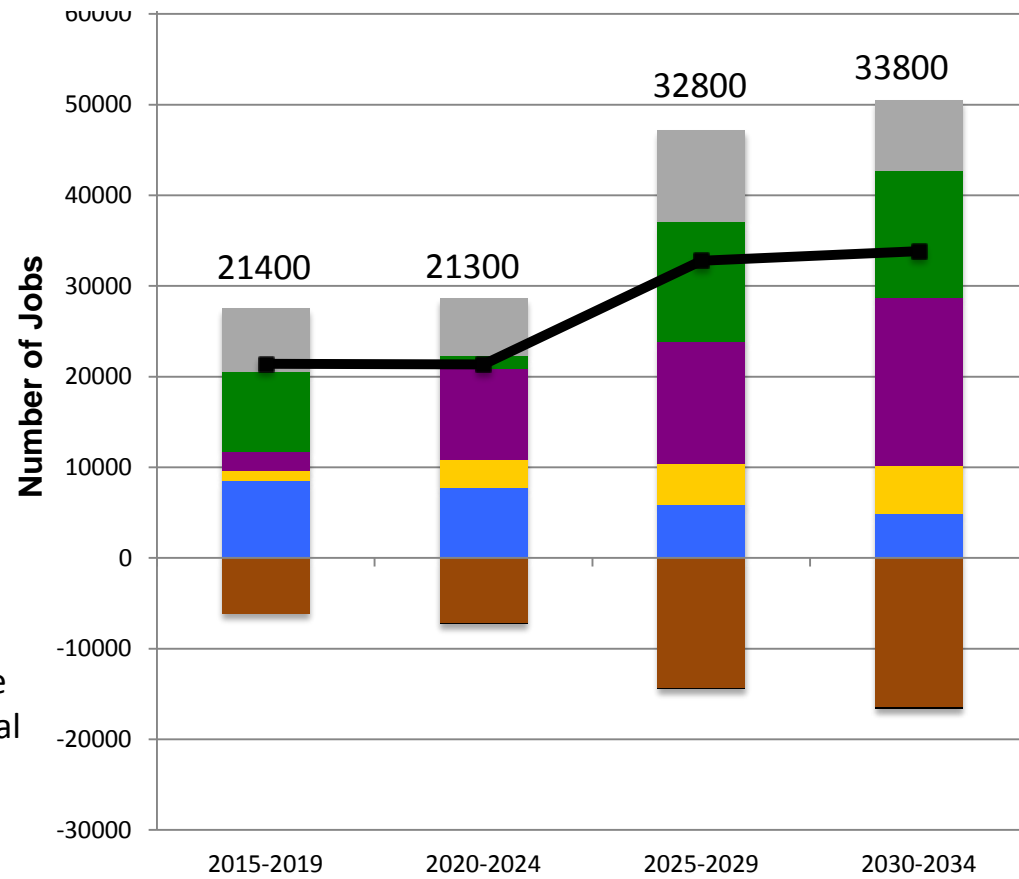
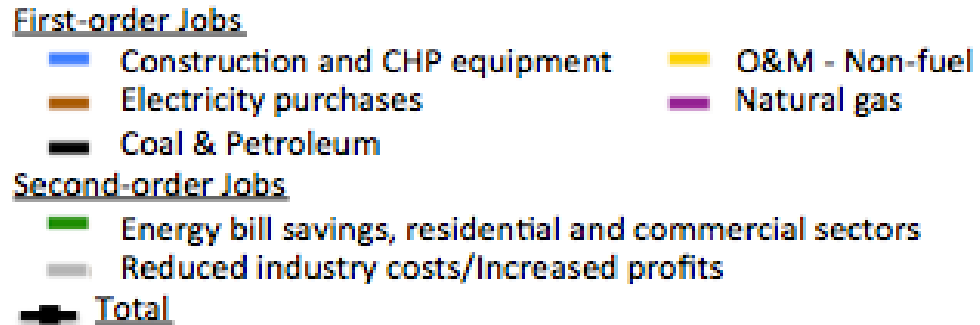
# Estimated Employment Growth with a 20% ITC

14 GW of new CHP capacity between 2015 and 2035 would create 21,000-34,000 jobs.

- Direct jobs in manufacturing, construction, O&M
- Indirect and induced jobs, resulting from redirection of industrial energy expenditures and re-spending of energy-bill savings due to price and demand changes

Such job impacts are typical of energy efficiency investments.

Source: K. Gyungwon, P. Baer and MA Brown. 2013. "The Statewide Job Generation Impacts of Expanding Industrial CHP," *Proceedings of the American Council for an Energy Efficient Economy (ACEEE) Summer Study on Energy Efficiency in Industry*, July 23-26, Niagara Falls, NY.



# CONCLUSIONS/RECOMMENDATIONS

- Create a shared vision about the value of CHP – today and in light of forthcoming Clean Air Act rules.
- Include CHP in integrated system planning.
- Address regulatory barriers.
- With a policy makeover, CHP could help America build a prosperous and secure future based on low-carbon and clean energy.

Weyerhaeuser, MS, pulp plant on 6/21/11: Producing 68 MW of electricity, consuming 49 MW, and selling 19 MW back to the grid.



# FOR MORE INFORMATION

**Dr. Marilyn A. Brown**, Professor  
Georgia Institute of Technology  
School of Public Policy  
Atlanta, GA 30332-0345  
[Marilyn.Brown@pubpolicy.gatech.edu](mailto:Marilyn.Brown@pubpolicy.gatech.edu)

Climate and Energy Policy Lab:  
<http://www.cepl.gatech.edu>

