

# Texas CHP Policy Forum

Austin, Texas

November 3, 2010



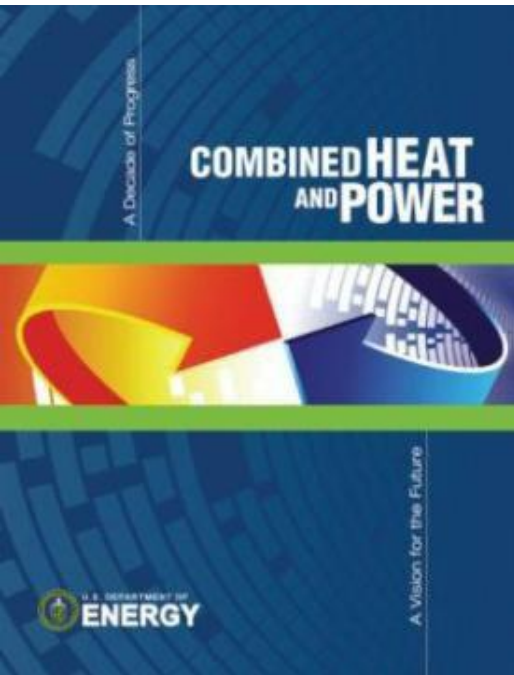
## *Combined Heat and Power*

### *The Family Tree*

Dan Bullock

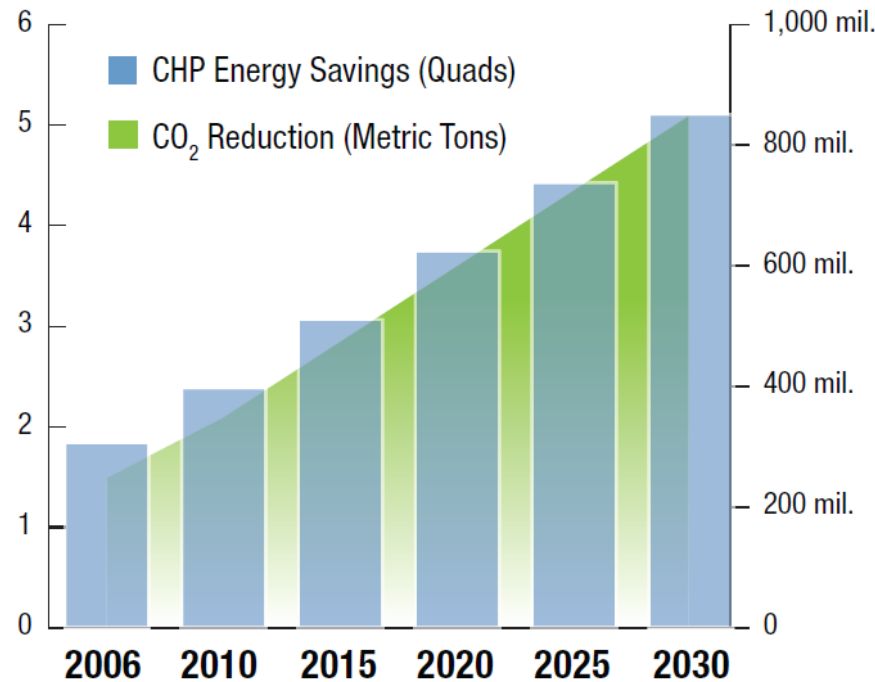
Director, U.S. DOE Gulf Coast Clean Energy Application Center

# CHP's Opportunity Aggressive Scenario



**CHP Energy Savings  
(Quads)**

**CO<sub>2</sub> Reduction  
(Metric Tons)**



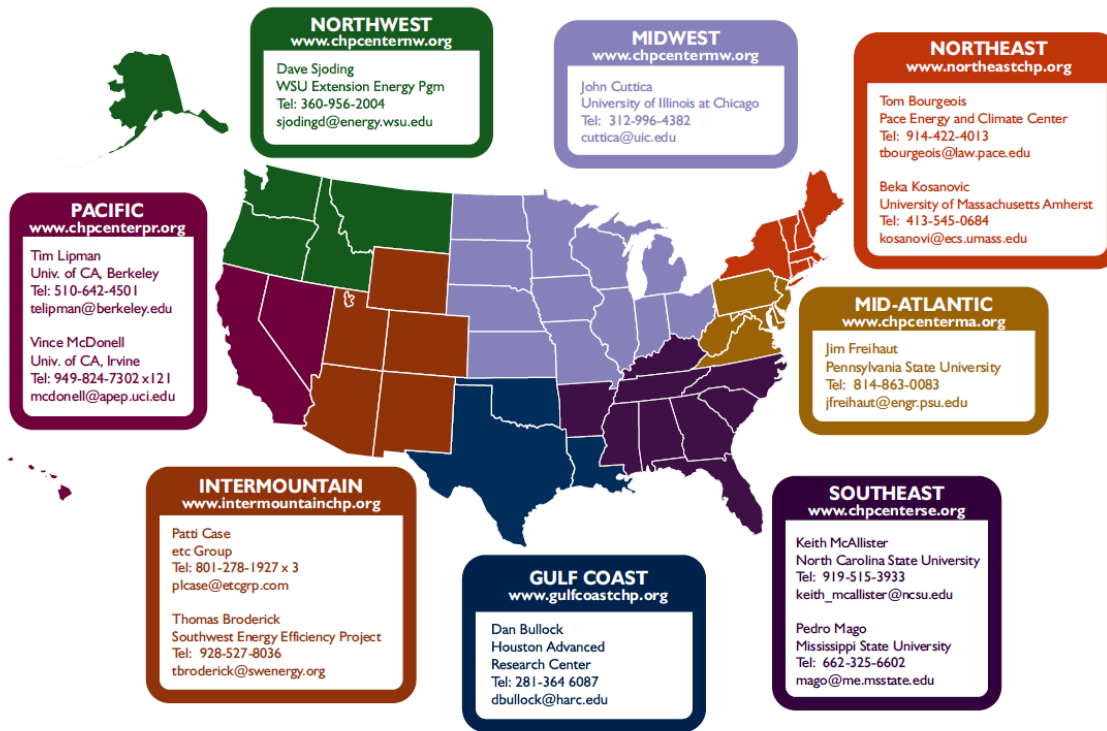
\*Based on a scenario in which 20% of generation capacity in 2030 is met with CHP

## Benefits of CHP, 2030

CHP Capacity	241 GW
Annual Fuel Savings	5.3 quads
Total CO <sub>2</sub> Reduced	848 MMT
Cars Off the Road	154 million

# Clean Energy Application Centers

## DOE Clean Energy Application Center Locations, Contacts, and Web Sites



## Mission:

- Support project development
- Promote technology as an effective clean energy solution
- Educate prospective users & policy makers on the benefits and available resources

## Services:

- Unbiased Information
- Targeted Education
- Technical Assistance


## DOE Clean Energy Application Center Program Contacts

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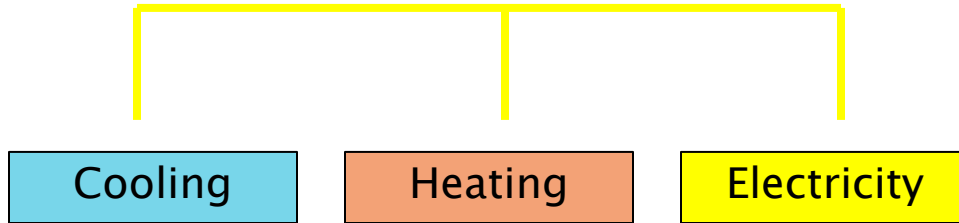
Patti Garland  
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# CHP Family Characteristics

1. System is located adjacent to a host facility
  2. It provides heat and electricity to that facility
  3. A variety of technologies and fuels are possible
  4. It results in efficiency gains, environmental benefits, and improved energy security.
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# Developing the CHP Family Tree

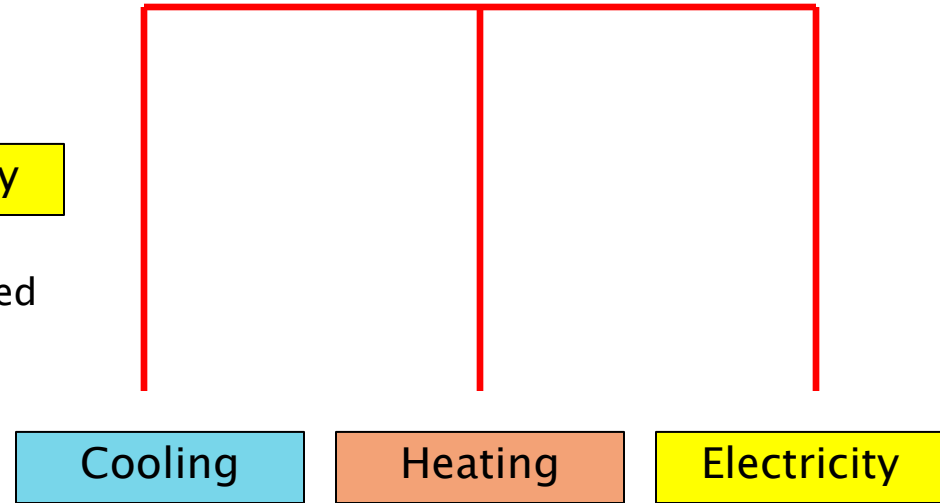
Generate Electricity First,  
then Use Surplus Heat For



Combined  
Cycle

- Absorption chiller
- Adsorption chiller
- Steam Turbine Chiller
- ORC + Electric Chiller

Heat Something First,  
Then Use Surplus Heat For



Energy Efficiency

- Steam turbines
- Organic Rankine Cycle (ORC)

# CHP Has Two Major Categories

## Topping Cycles

1. Use fuel to first generate power, then
2. Capture resulting heat for use as:
  - Heat – “Heating and Power” (cogeneration)
  - Cooling – “Cooling and Power”

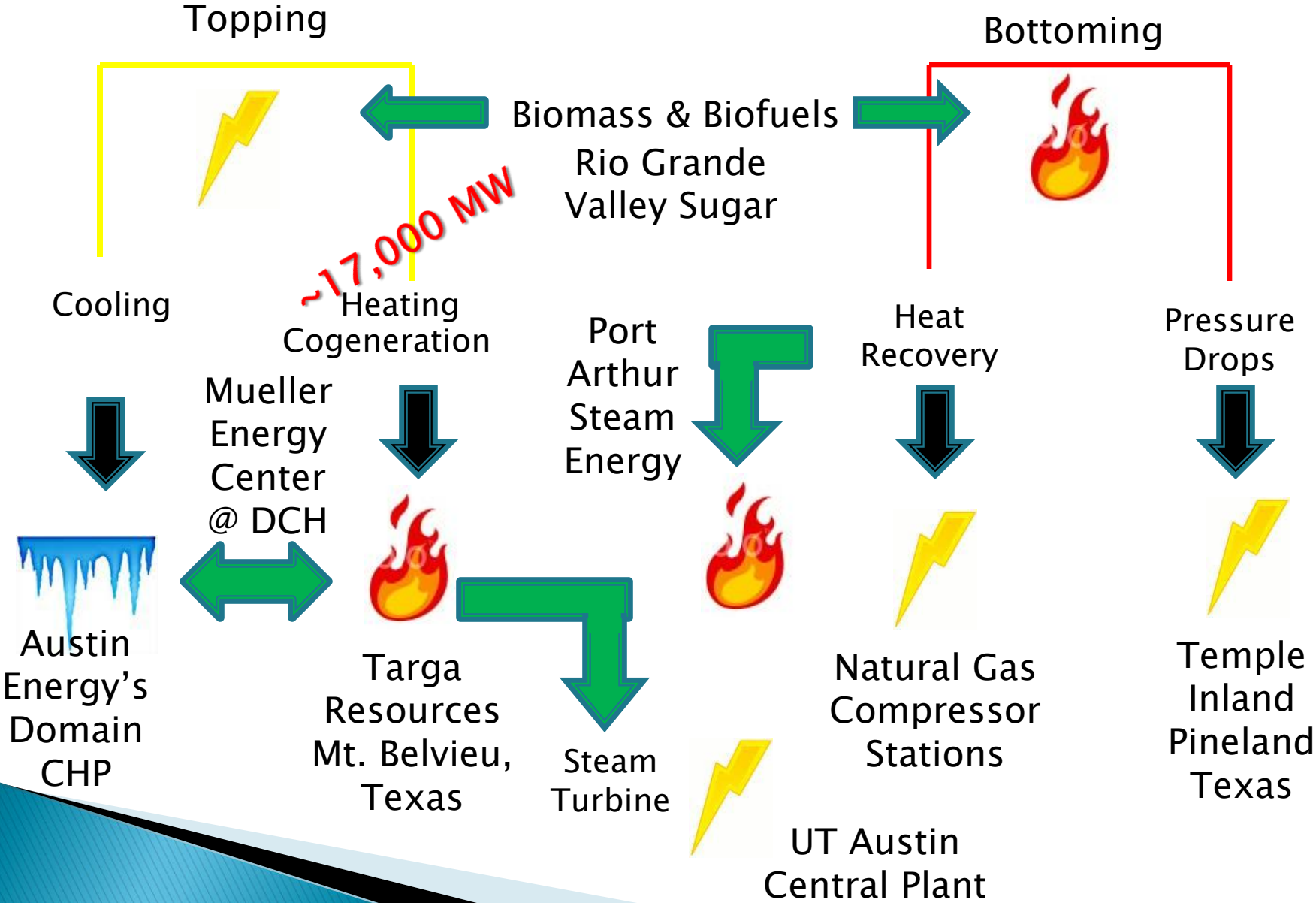
Equipment: Gas turbine, engine, fuel cell, boiler/steam turbine

## Bottoming Cycles

1. Use fuel for something other than power (kiln, furnace, compressor, pump), then
2. Capture waste heat for use as:
  - Electricity

Equipment: HRSG/steam turbine, ORC

# CHP Family Tree



# CHP Has Many Flavors

- ▶ Common family traits, but:
  - Vast size differences
  - Application differences
  - Blending
  - Performance differences
  - Conventional vs emerging technology
- ▶ Each flavor has its own character with regard to:
  - Existing installed based
  - Market potential
  - Technology readiness levels
  - Efficiency
  - Installed costs
  - Barriers

# Public Policy

- ▶ We need to think about whether and how public policy should be tailored to address the different needs of each branch of the CHP family tree.