The Market for CHP in Florida

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An ICF International Company

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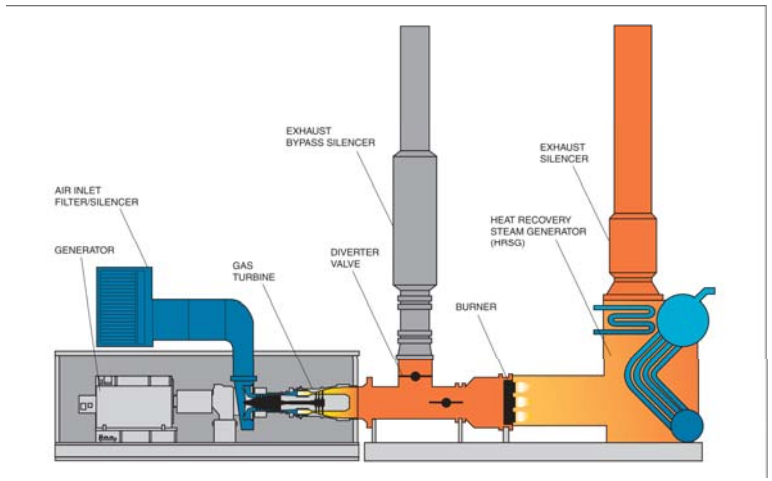
Overview

- CHP Benefits
- Existing CHP Installations
  - US Total
  - Florida
- CHP Potential
- Emerging Trends

What Is Combined Heat and Power?

CHP is a highly efficient energy system that:

- Generates power at or near the point of use
- Recovers waste heat for
  - heating
  - cooling
- Can utilize a variety of technologies and fuels
- CHP provides over 10 percent of U.S. electricity generation

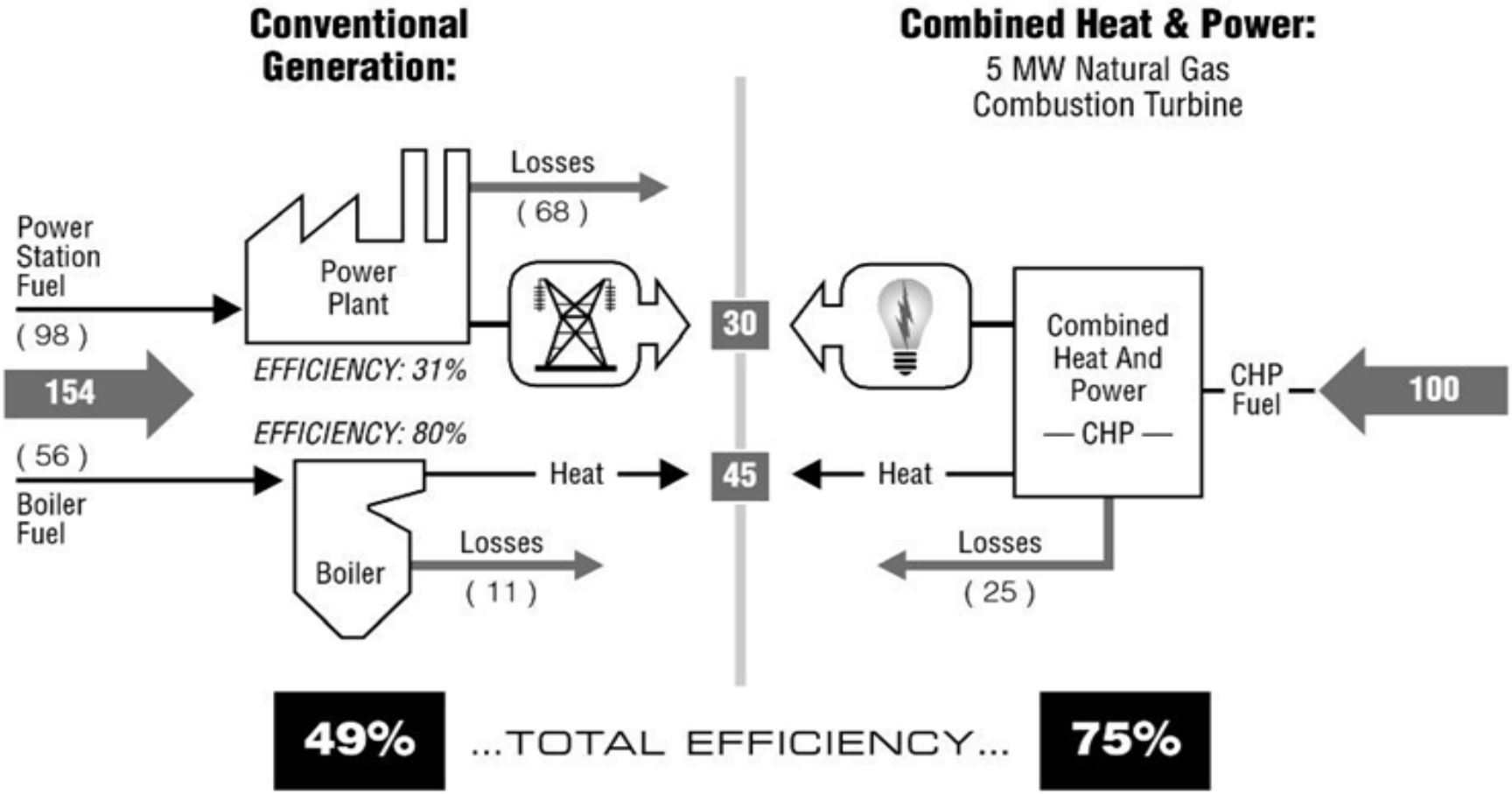


Courtesy Solar Turbines Incorporated

What Are the Benefits of CHP?

- **CHP is more efficient than separate generation of electricity and thermal energy**
- Higher efficiency translates to lower operating cost
- Higher efficiency reduces emissions of all pollutants, including CO_2, NO_X and SO_2
- CHP can increase power reliability and enhance power quality
- On-site electric generation can help reduce grid congestion

Efficiency Benefits of CHP



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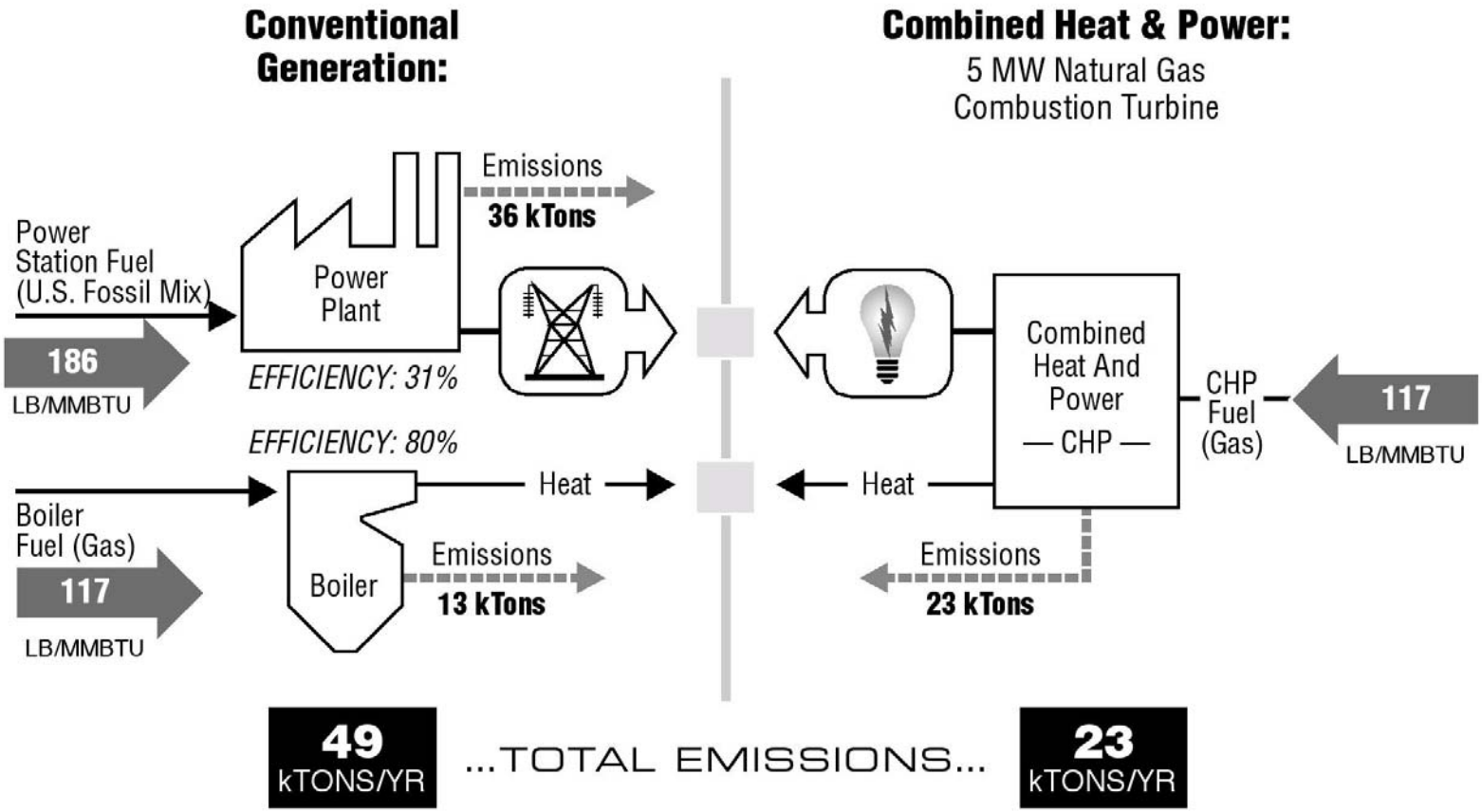
Environmental Benefits of CHP (CO_2)



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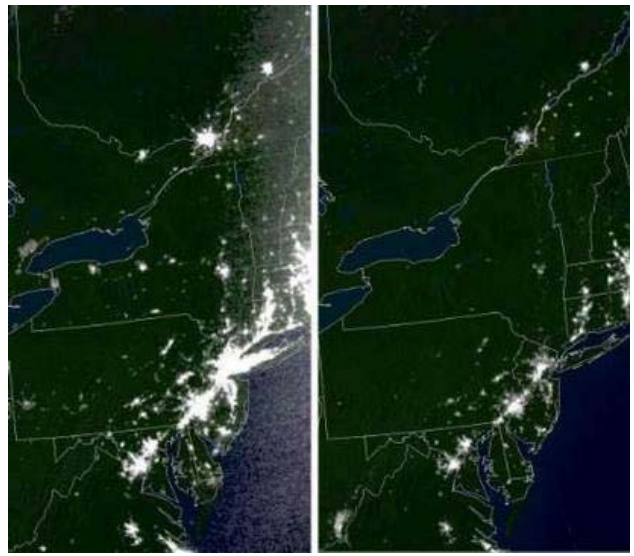
Energy Reliability Benefits of CHP

- Blackout of 2003: Affected portions of the Midwest, Northeast, and Ontario, Canada
- Power out for up to four days in some locations
- Over 50 million people affected
- Total losses estimated at $10 billion



Traditional Emergency Generators Had Problems

- "Half of New York City's 58 hospitals suffered backup power failures during the blackout" – *New York Times, 8/16/2003*
- "Lack of backup power allowed 145 million gallons of raw sewage to be released from a Manhattan pumping station" – *Times Union, 8/29/2003*
- "Jail's emergency generator fails during blackout, again…" – *Times Union, 8/16/2003*
- "Generator failures at a Verizon office …caused communications gaps for 911 dispatchers…" – *Daily News, 8/17/2003*

CHP Systems Kept Facilities Running

- Montefiore Medical Center; New York City
  - Site down for 5 minutes, then fully operational throughout the duration of the outage
- Spring Creek Towers, New York City
  - Independent of grid, never lost power and was able to provide for some needs of the community
- South Oaks Hospital, Amityville, NY
  - Seamless transfer to CHP system only; staff unaware of blackout until police call

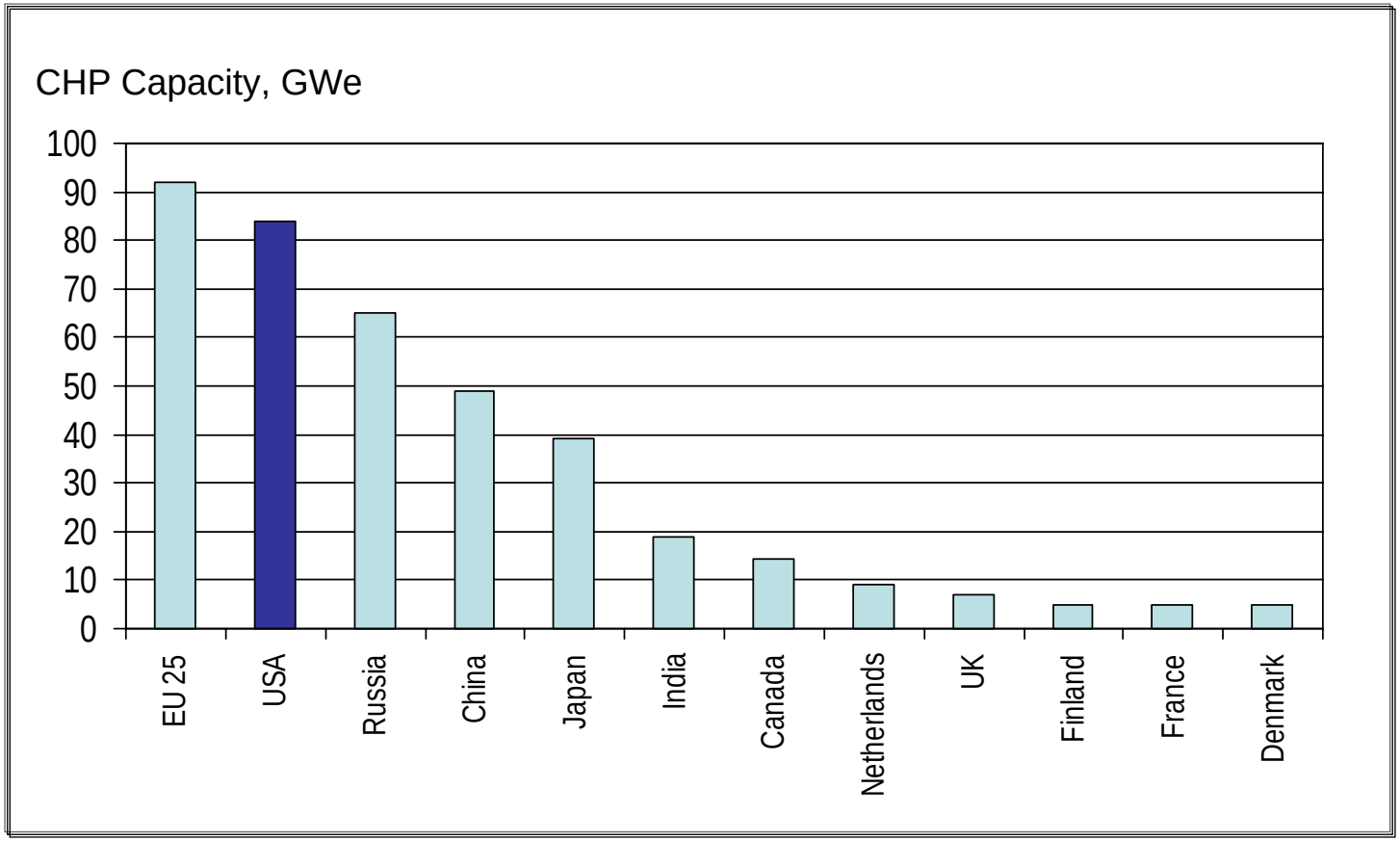
CHP Kept Power on during Katrina

- Baptist Hospital, Jackson, MS
- 624 bed urban hospital, 3000 employees
- 3.2 MW gas turbine CHP system – installed 1994
- Steam used for hot water, sterilization and absorption chillers
- Grid down for 52 hours starting August 29, 2005 due to Katrina
- CHP system ran islanded and provided power, hot water and air conditioning

The Shape of CHP in 2008

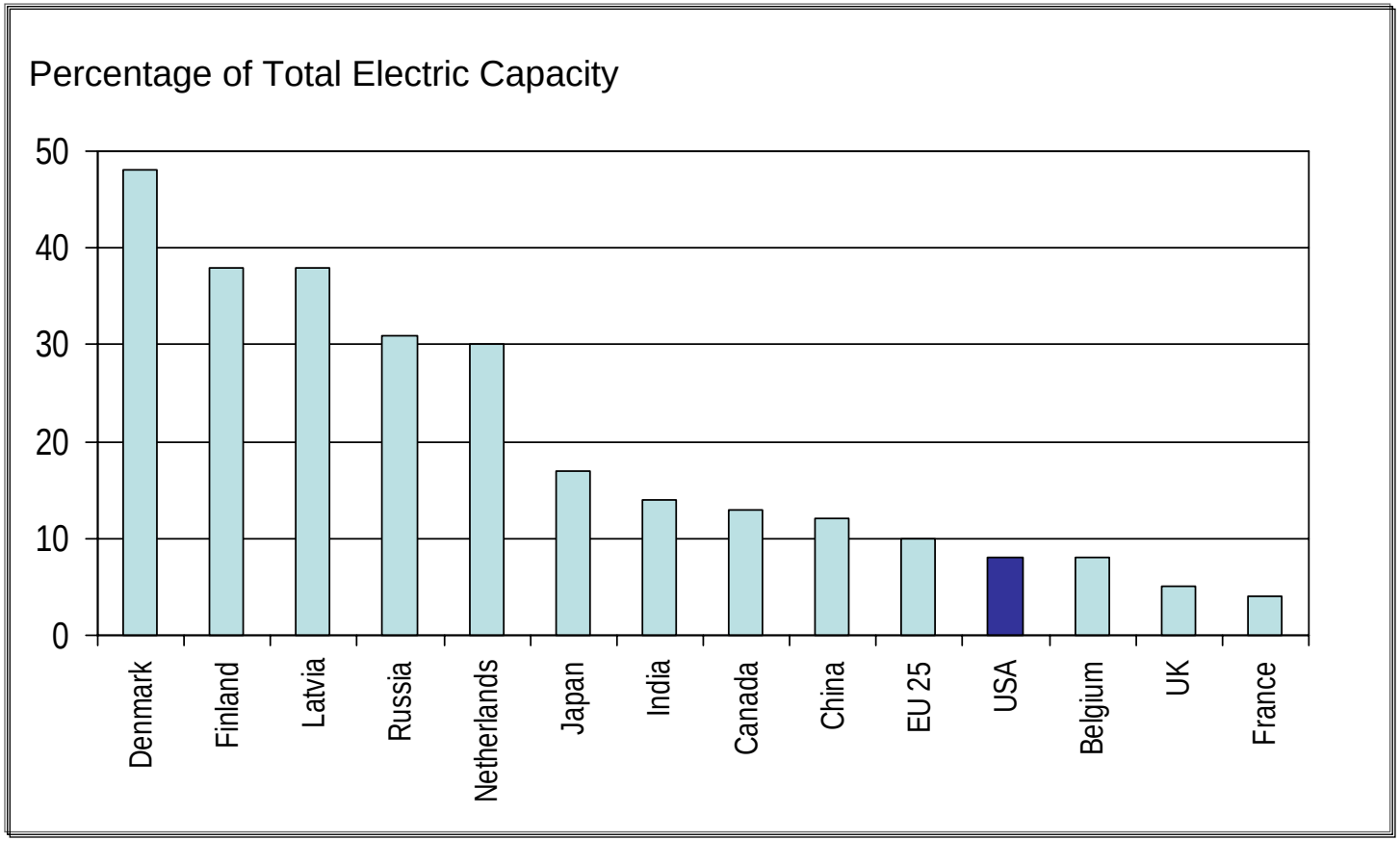
- 85,236 MW installed at 3,382 sites (nationally)
- Average capacity is 25.2 MW
- Median capacity is 1.3 MW
- Represents almost 8% of total U.S. generating capacity
- *Saves over 3 quads of fuel each year!*
- *Eliminates over 400 million tons of CO_2 emissions each year!*

While Current US CHP Capacity Looks Impressive

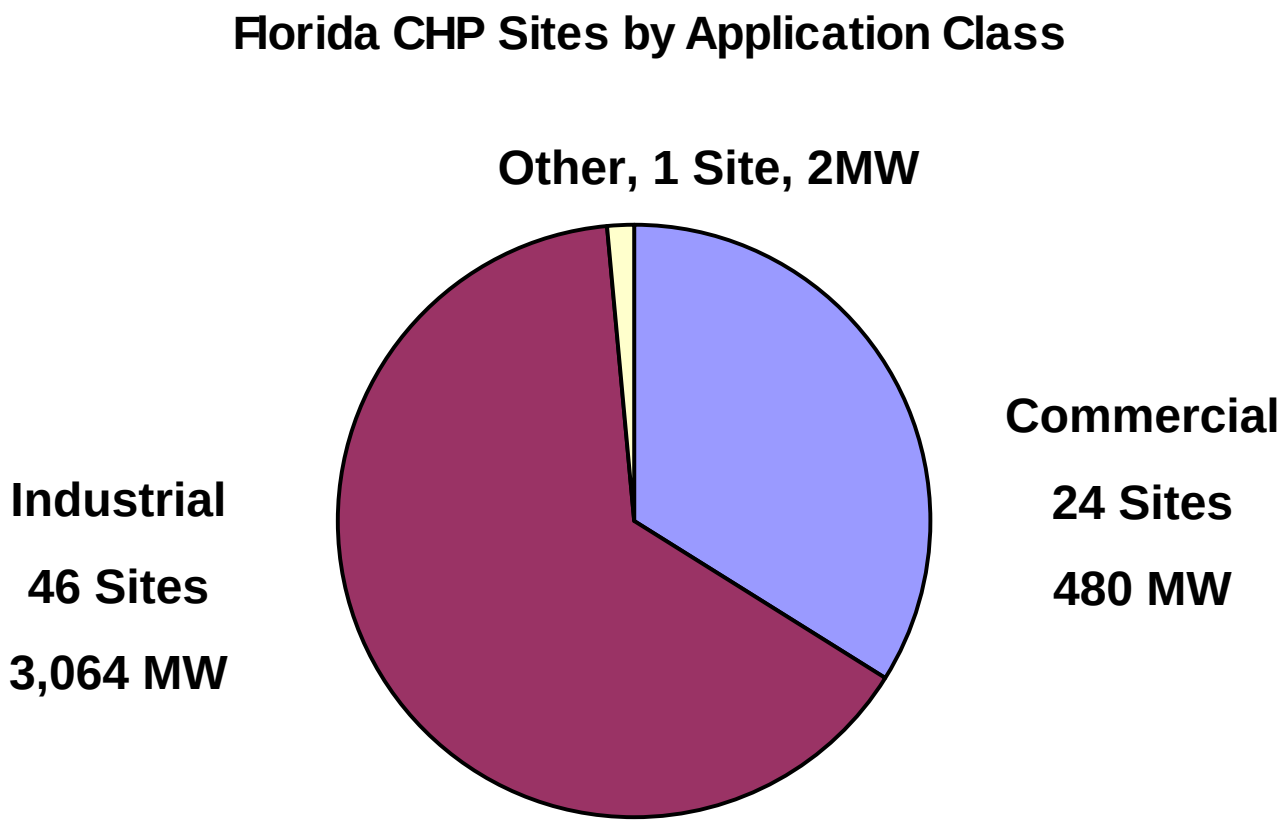


WADE 2006

Use of CHP is Below Many Other Countries



Existing CHP in Florida (71 Sites, 3,546 MW)



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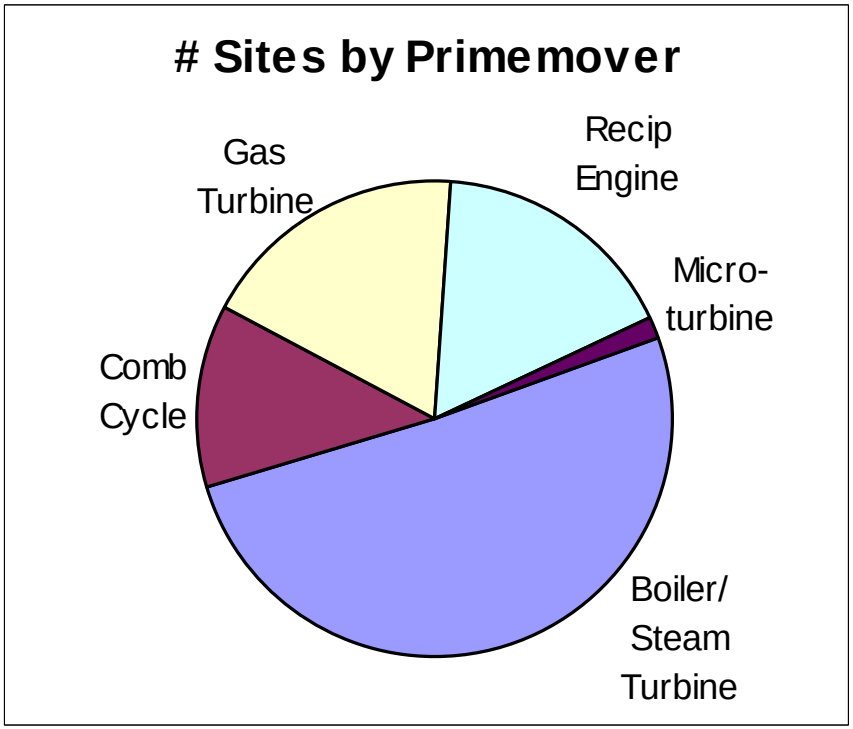
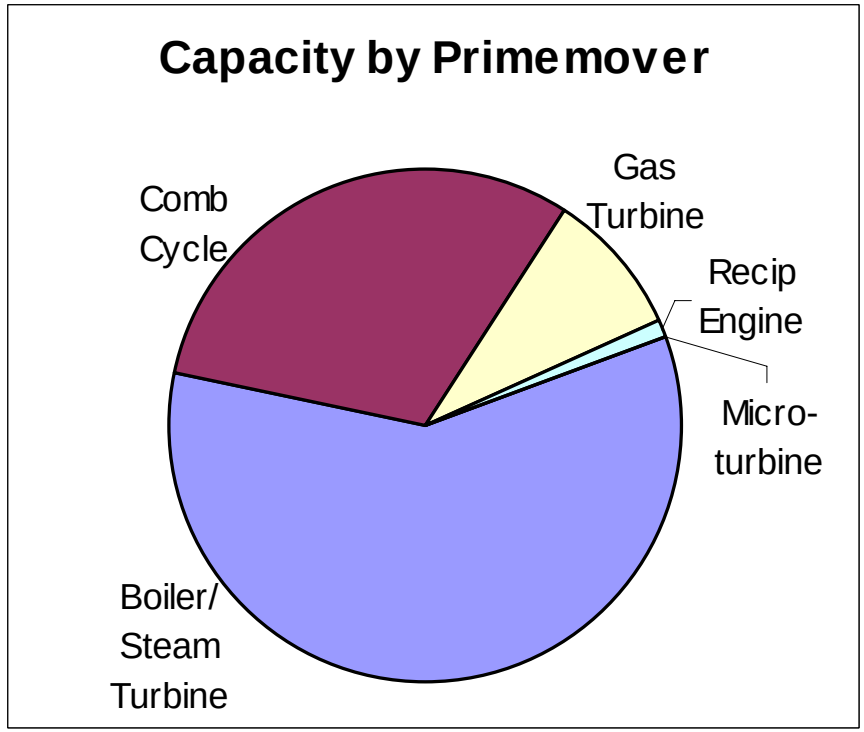
Top 5 Florida CHP Applications

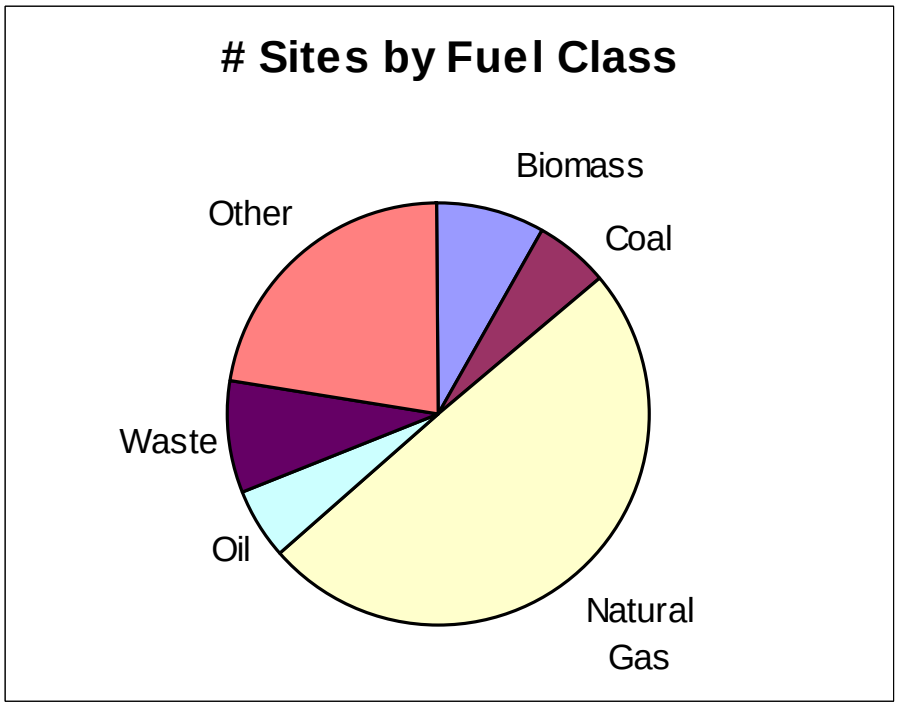
Application	# Sites	Capacity (MW)
Chemicals	19	1,131
Food Processing	15	1,070
Paper	10	693
Hospitals	6	25
Wastewater Treatment	3	14

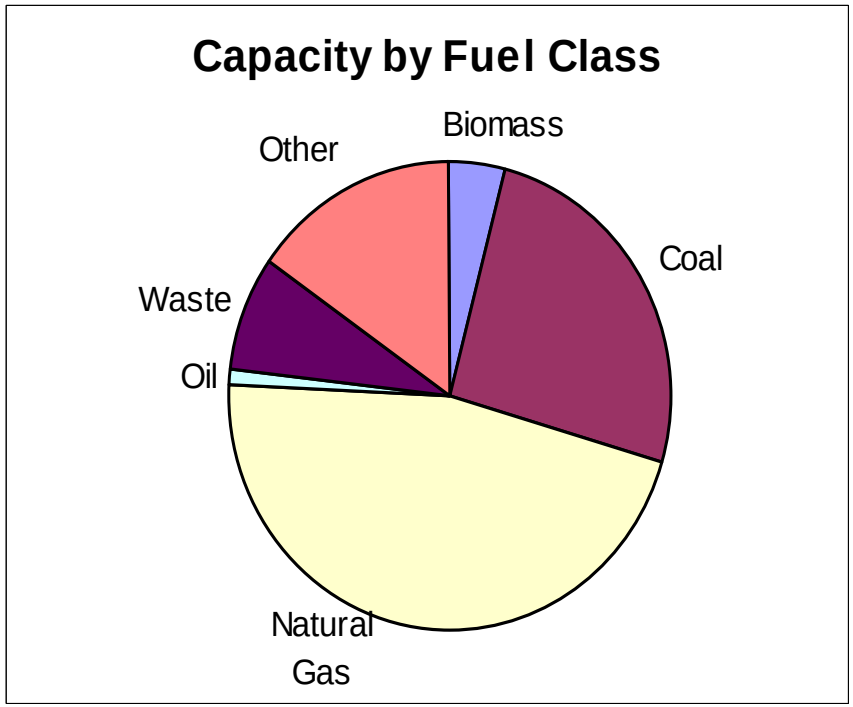
Florida CHP Primemovers



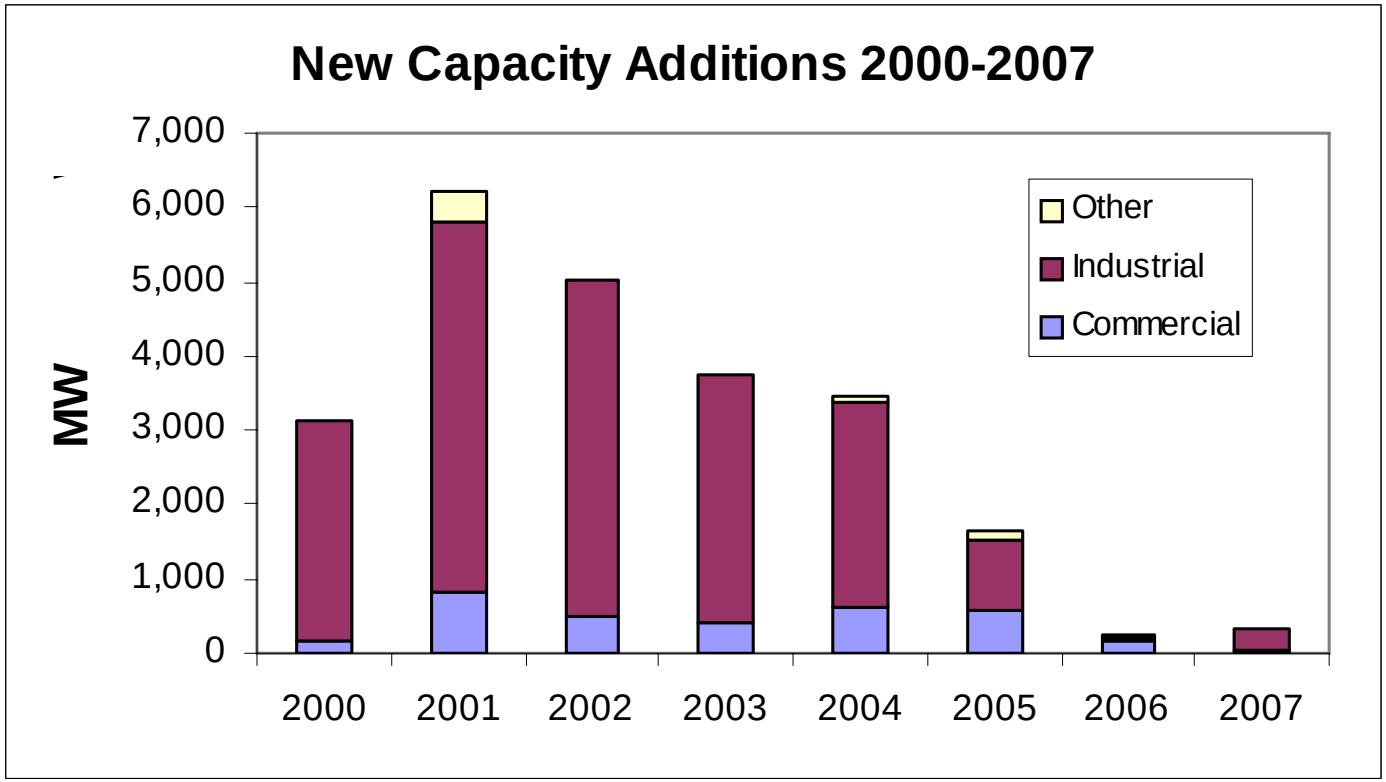


Florida CHP Fuel Mix





U.S. Capacity Additions: 2000 - 2007



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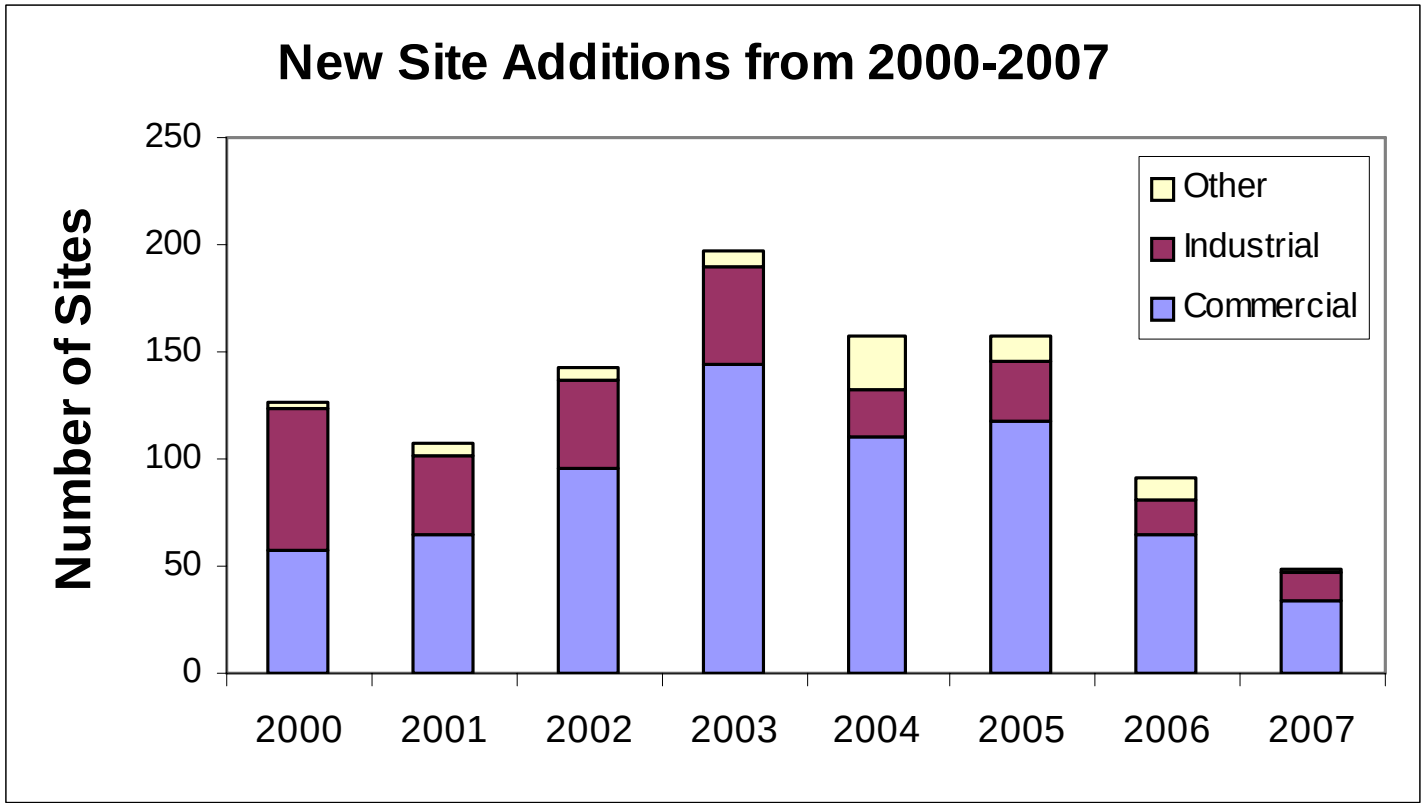
U.S. Site Additions: 2000 - 2007



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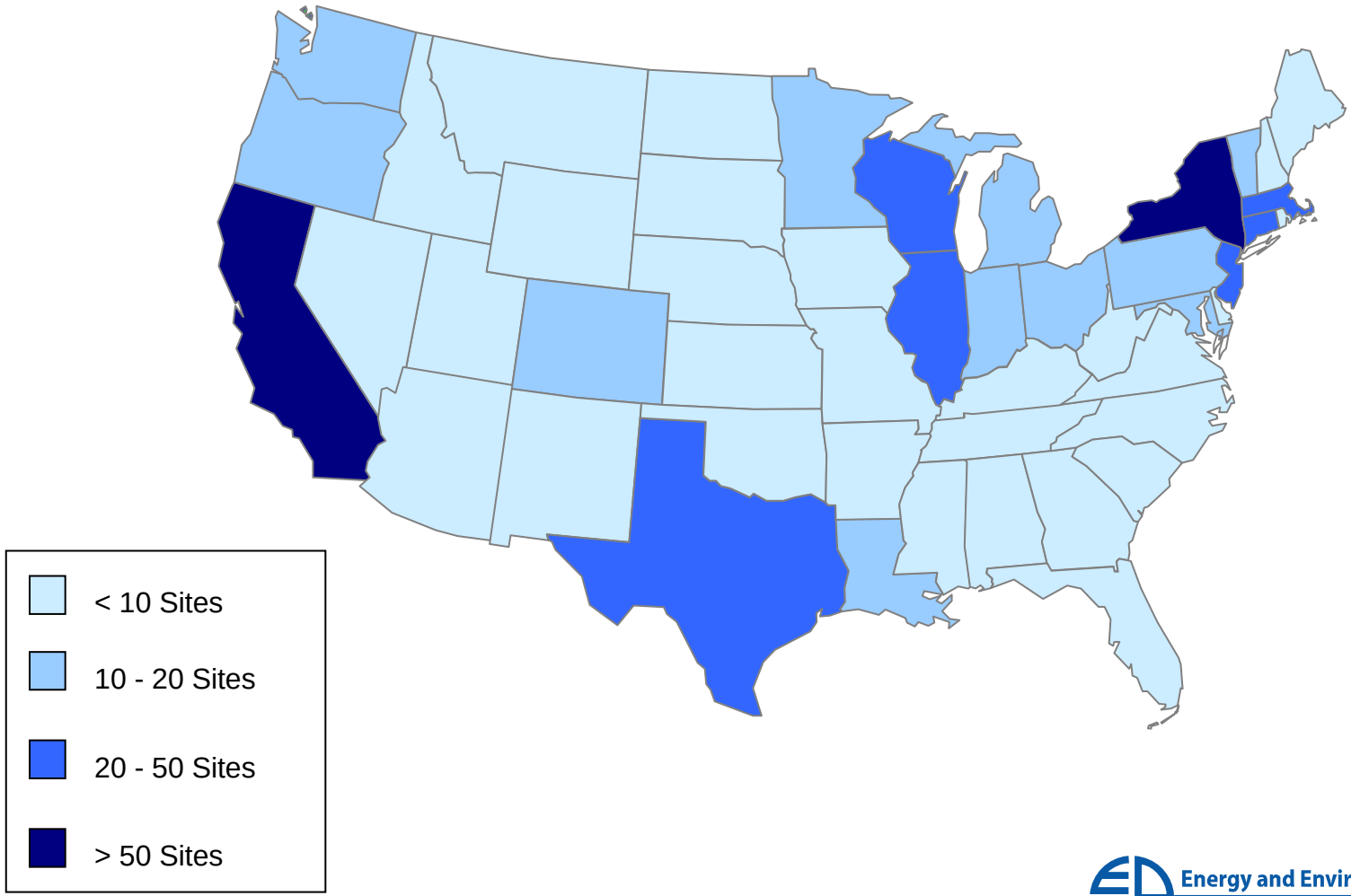
CHP Site Additions by State: 2000-2007



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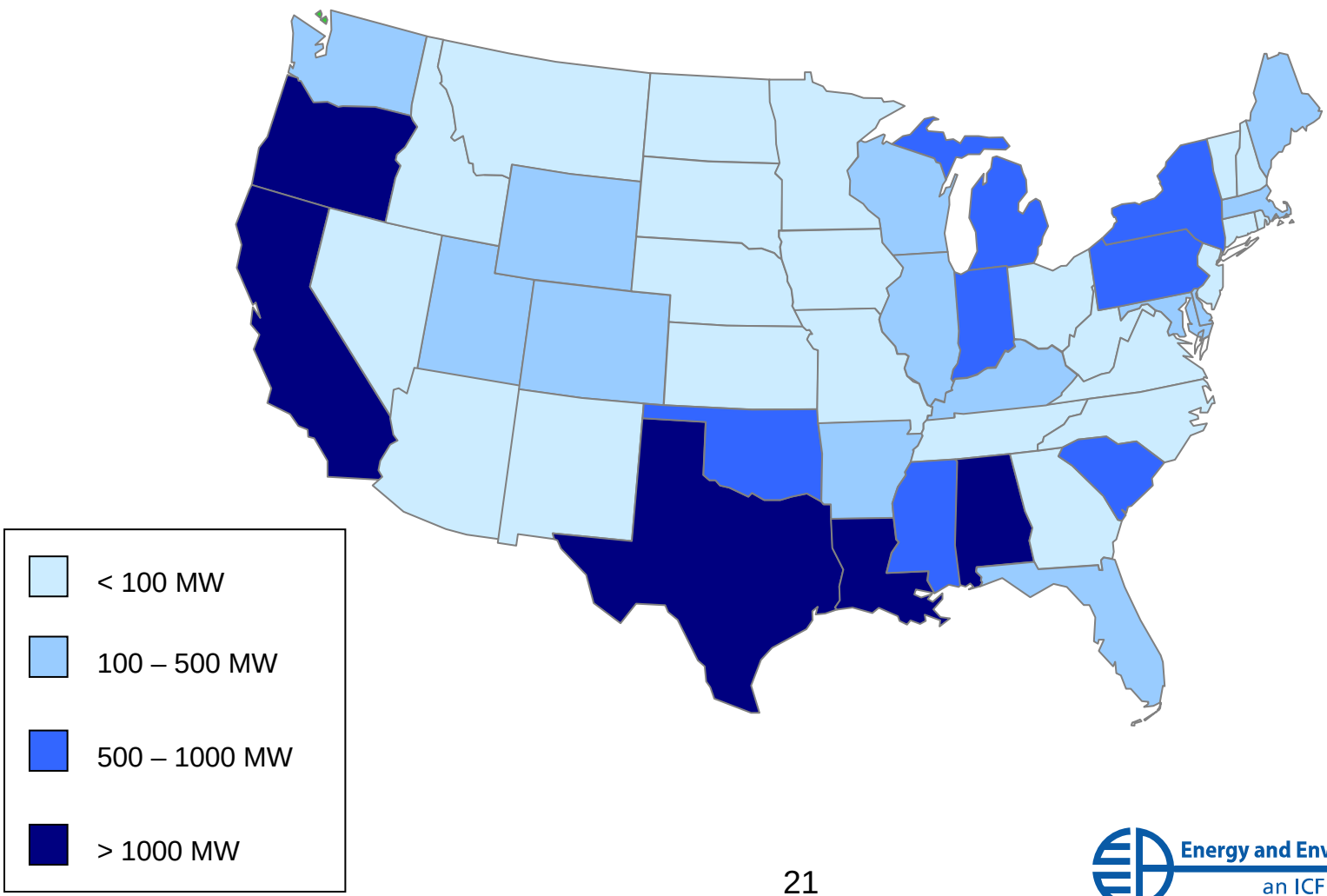
CHP Capacity (MW) Additions by State: 2000-2007



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Where do we go from here?

The Potential for Additional U.S. CHP Is Large

- Industrial: 70 to 90 Gigawatts
- Commercial/ Institutional: 40 to 60 Gigawatts
- *4 to 5 Quads of Energy Savings*
- *Reduction of 500 to 700 million tons of annual CO_2 emissions*

The Future of U.S. CHP Is Very Different from the Existing Base

- Almost one-half of the potential is in commercial/institutional applications
- Just over one-half of the potential is in systems below 5 MW in size
- Much of the potential is in applications with limited experience with CHP
  - Industrial – food processing, fabrication and assembly
  - Commercial – lodging, hospitals, schools, office buildings, multifamily

CHP Potential Definitions

- Technical Potential
  - Total capacity potential from existing and new facilities where CHP provides a reasonable fit to the electric and thermal needs of the site.
  - Does not consider economic rate of return or other factors affecting the ability to install CHP.
- Economic Potential
  - Reflects the share of technical potential that would consider the CHP investment economically acceptable.
- Market Penetration
  - Represents an estimate of CHP capacity that will actually enter the market.

Florida CHP Technical Potential

- Industrial CHP Technical Potential
  - 2,364 Sites
  - 933 MW
  - 78% of potential is in sites under 5 MW
- Commercial/Institutional CHP Technical Potential
  - 22,248 Sites
  - 6,699 MW
  - 90% of potential is in sites under 5 MW

Florida CHP Market Values

	50-500 kW	500-1,000 kW	1-5 MW	5-20 MW	>20 MW	Total MW
Technical Potential	2,915	3,581	3,486	1,015	133	11,130
Economic Potential	75	0	198	59	25	357

Results in ACEEE report, "Potential for Energy Efficiency/Renewable Energy to Meet Florida's Growing Energy Demands

Barriers to CHP Development

- Utility interface
- Permitting/siting issues
- Environmental regulatory treatment
- Immature sales/service infrastructure for small CHP
- Fuel price uncertainty
- CHP is a discretionary investment for the user

Florida CHP Environment

- New grid-interconnected CHP projects (non-PURPA qualifying facilities) are illegal unless they are owned by a regulated utility
- There are no statewide net metering rules
- Standard interconnection rules only apply to photovoltaic systems up to 10 kW
- A renewable energy production tax credit that CHP is eligible for was established in 2006
- CHP is eligible for the Renewable Energy Technologies Grants Program established in 2006.

Realizing the Full Potential for CHP will Depend on Changes……..

- To environmental regulatory treatment,
- To utility rate design and grid interconnect,
- To CHP technology cost and performance, and
- To user attitudes

Emerging Market Trends – a Change on the Horizon?

- Rising electricity prices?
- Interest in alternative fuels
- Interest in power reliability and energy security benefits
- Recognition of CHP by policymakers
  - National
  - State
- Greenhouse Gas Legislation

National Actions to Support CHP

- EPA Combined Heat and Power Partnership
  - Targeted market segments
  - State policies
- DOE back in the game
  - Support for the RACs
  - Future programs
- CHP legislation
  - Energy bill
  - Investment tax credit

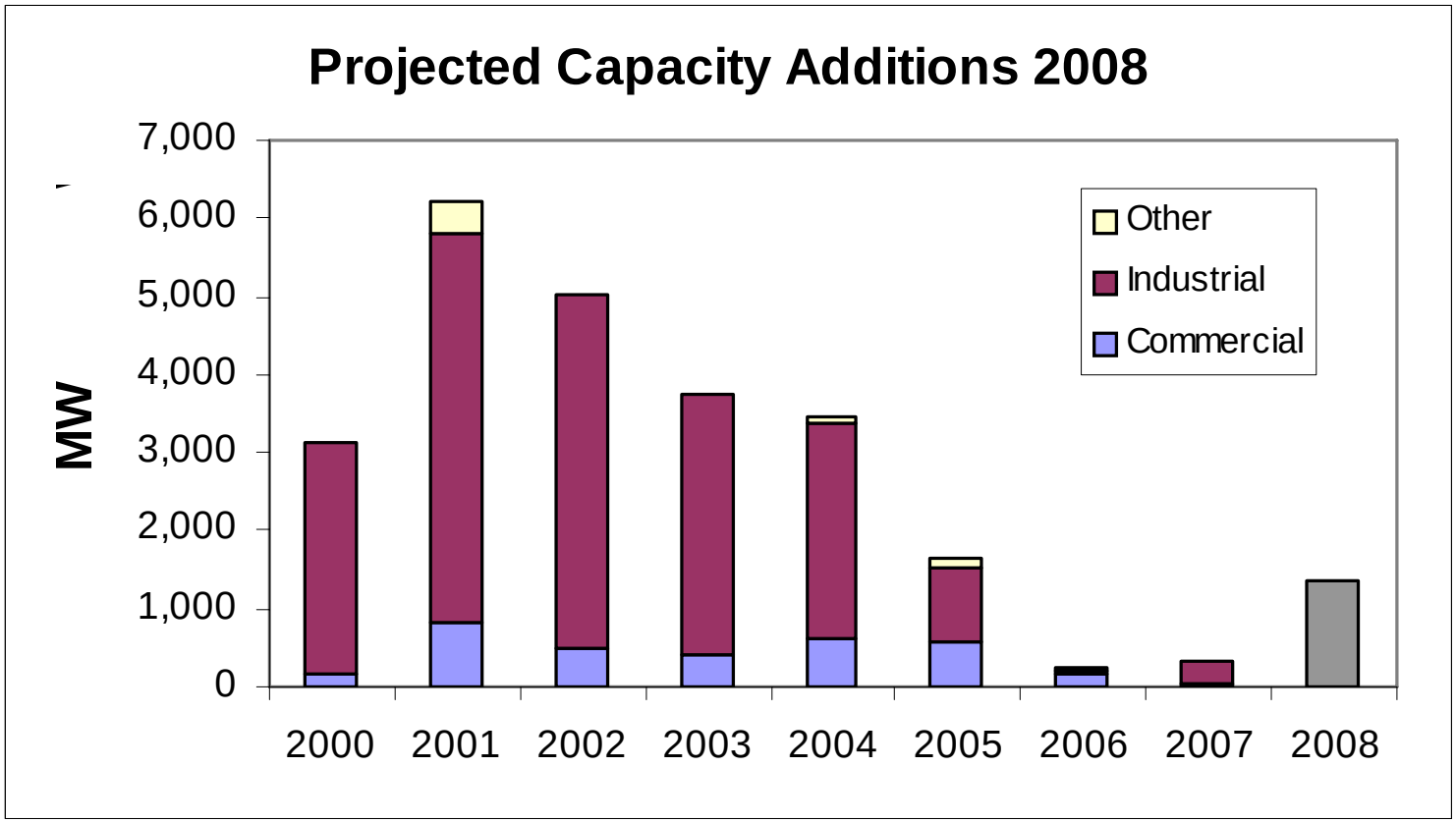
State Policies to Encourage CHP

- Output-based emissions standards with thermal credit
  - California
  - Texas
  - Delaware
  - Connecticut
- State-of-the-art Interconnection Standards
  - California
  - New York
  - Texas
  - *Oregon*
  - *Maryland*

State Policies to Encourage CHP

- CHP incentives
  - California
  - New Jersey
  - New York (Con Ed System-wide)
  - Connecticut
- CHP Included in Energy Portfolio Standards
  - Connecticut (CHP)
  - Pennsylvania (CHP)
  - North Carolina (CHP)
  - Washington (CHP)
  - Nevada (Waste Heat)
  - Arizona (Waste Heat)
  - Colorado (Waste Heat)

Projected CHP Additions: 2008



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Questions?

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