



The Market for CHP in Virginia

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Energy Efficiency and Clean Technology Track



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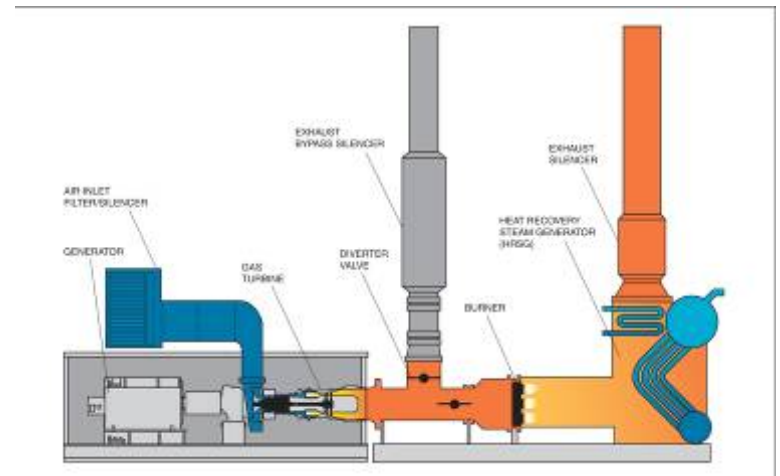
Overview

- CHP Benefits
 - Efficiency
 - Emissions
 - Reliability
- Existing CHP Installations
 - US Total
 - Virginia
- 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

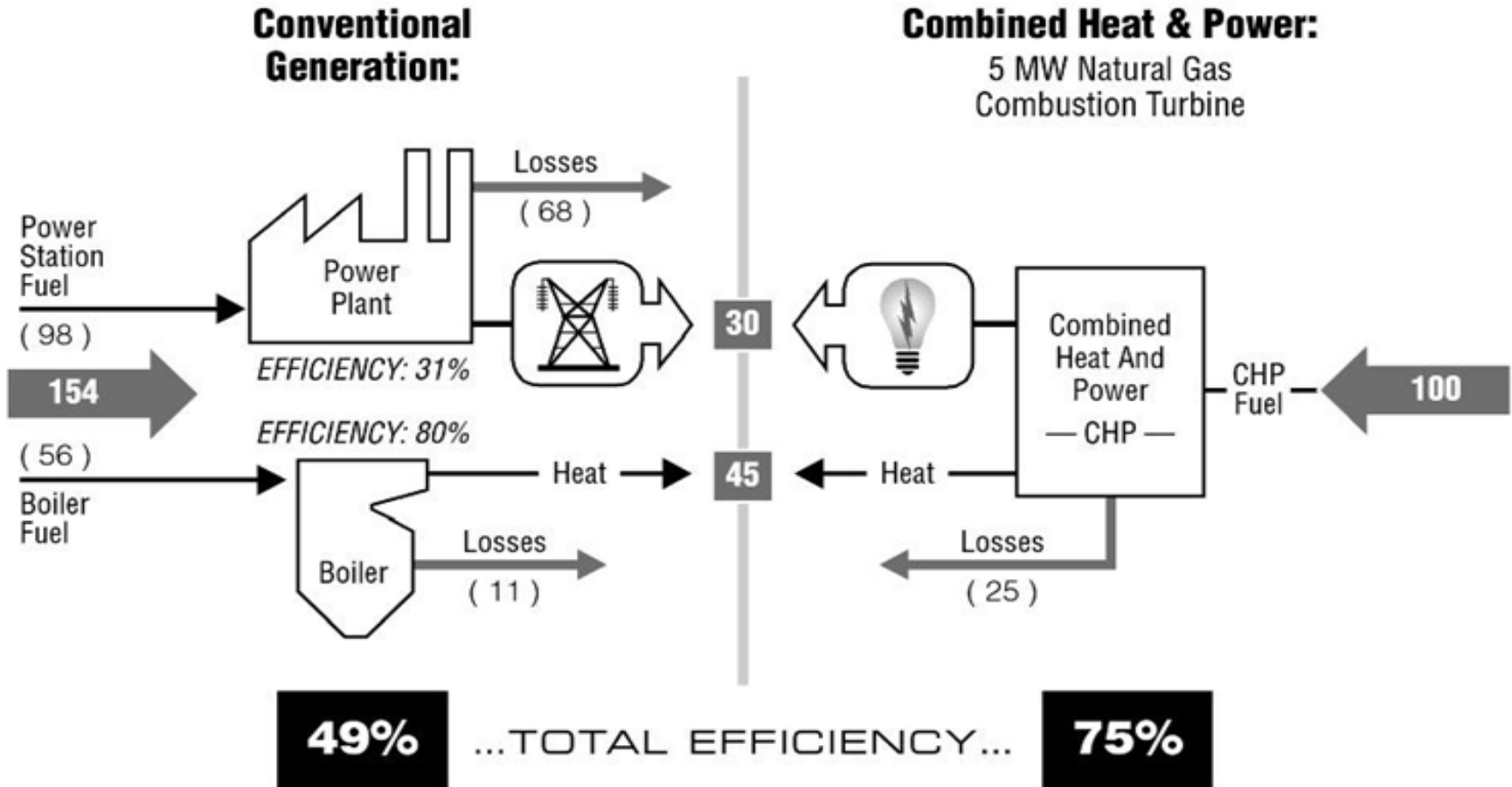


Courtesy Solar Turbines Incorporated

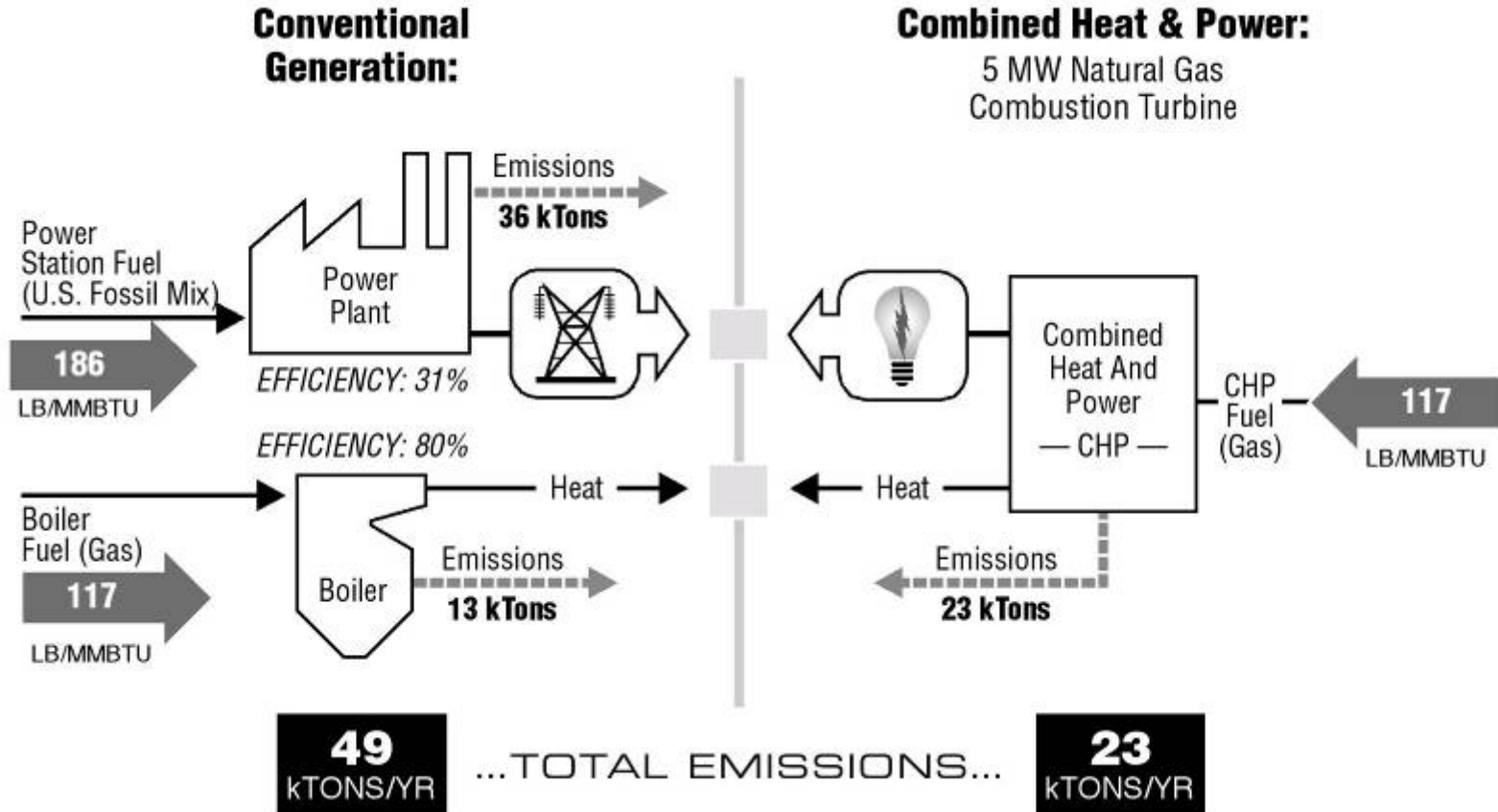
What Are the Benefits of CHP?

- **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 CO₂, NO_x and SO₂
- CHP can increase power reliability and enhance power quality
- On-site electric generation can help reduce grid congestion

Efficiency Benefits of CHP



Environmental Benefits of CHP (CO₂)



CHP Kept Power on during Katrina

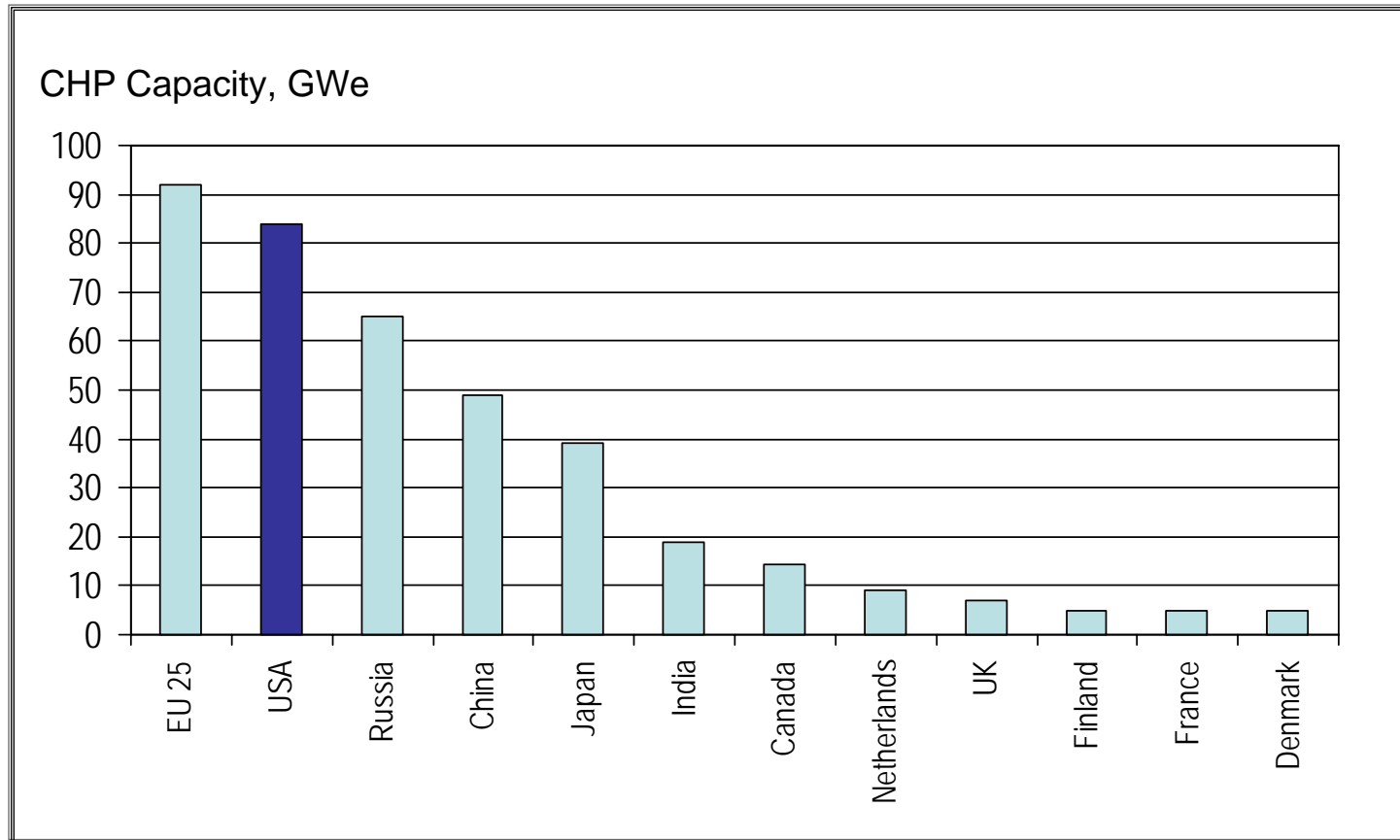
- Baptist Hospital, Jackson, MS
- 624 bed urban hospital, 3000 employees
- 3.2 MW gas turbine CHP system – installed 1994
- Steam used for hot water, sterilization and absorption chillers
- Grid down for 52 hours starting August 29, 2005 due to Katrina
- CHP system ran islanded and provided power, hot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



The Shape of CHP in 2008

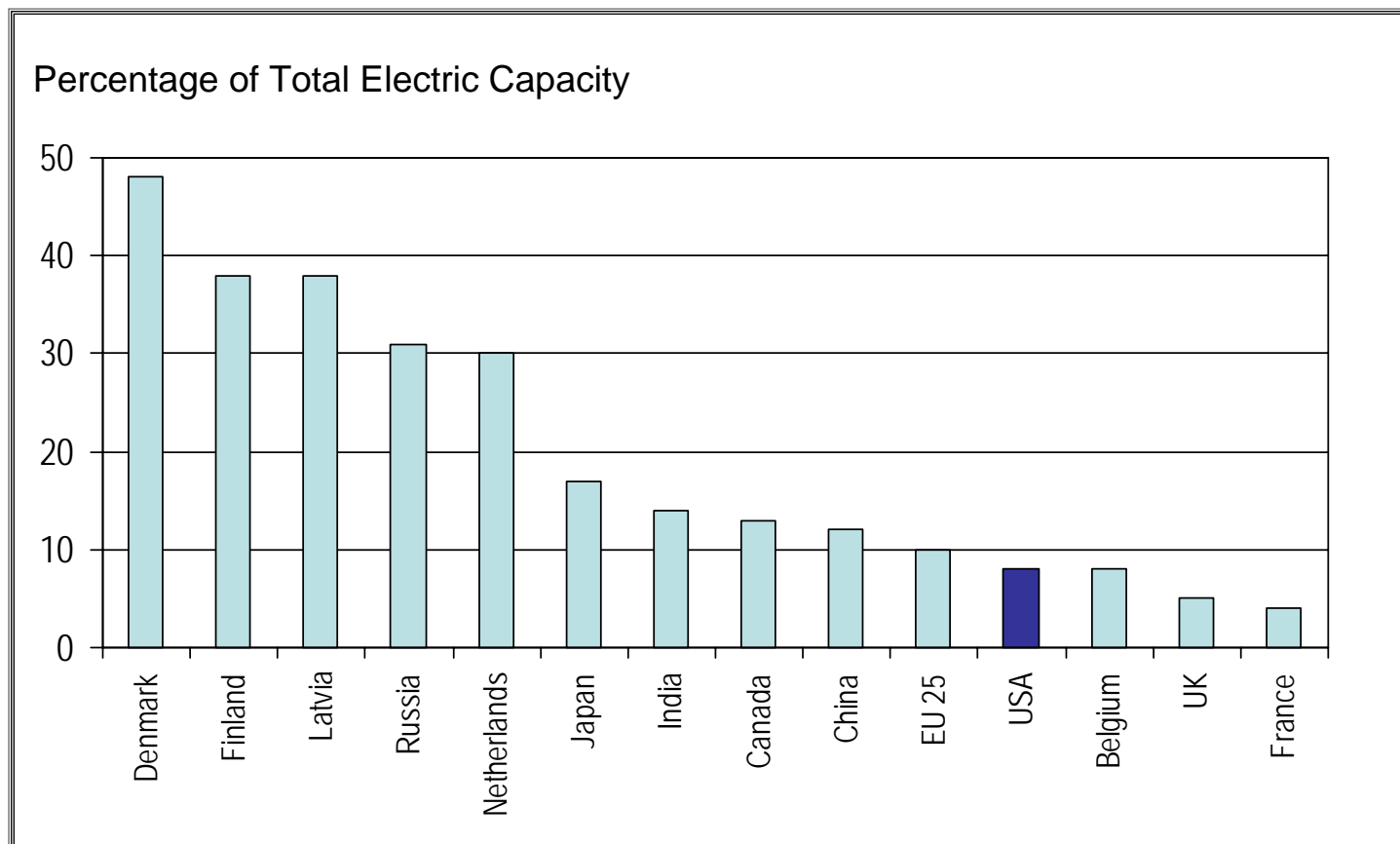
- 85,236 MW installed at 3,382 sites (nationally)
- Average capacity is 25.2 MW
- Median capacity is 1.3 MW
- Represents almost 8% of total U.S. generating capacity
- *Saves over 3 quads of fuel each year!*
- *Eliminates over 400 million tons of CO₂ emissions each year!*

While Current US CHP Capacity Looks Impressive



WADE 2006

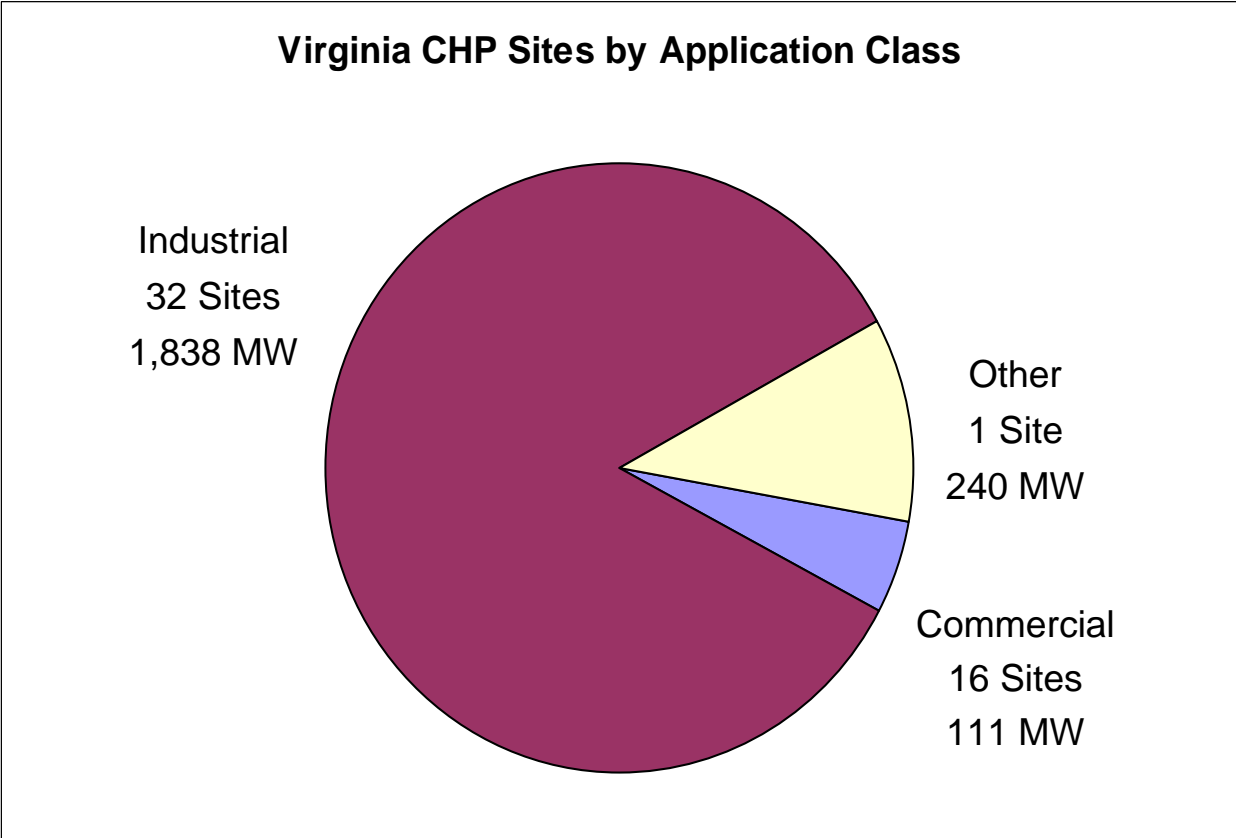
Use of CHP is Below Many Other Countries



WADE 2006



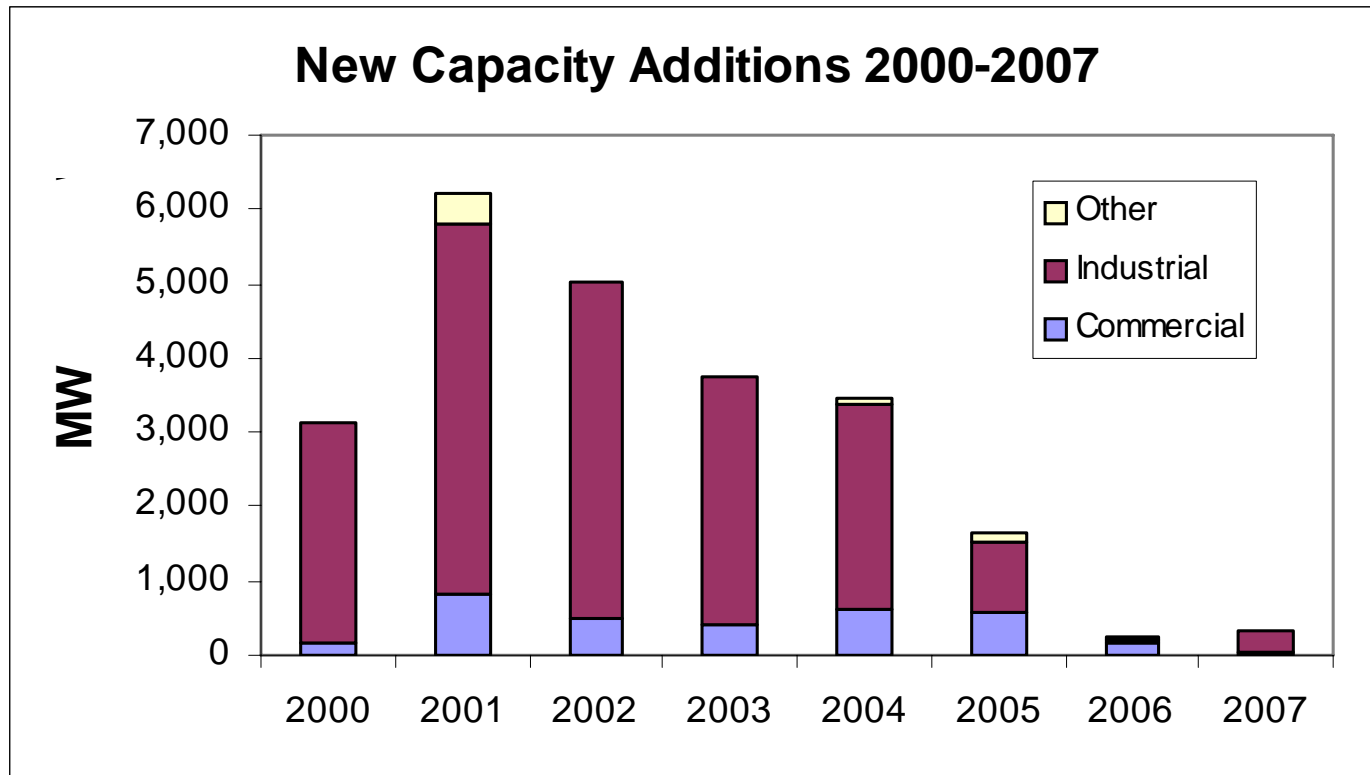
Existing CHP in Virginia (49 Sites, 2,189 MW)



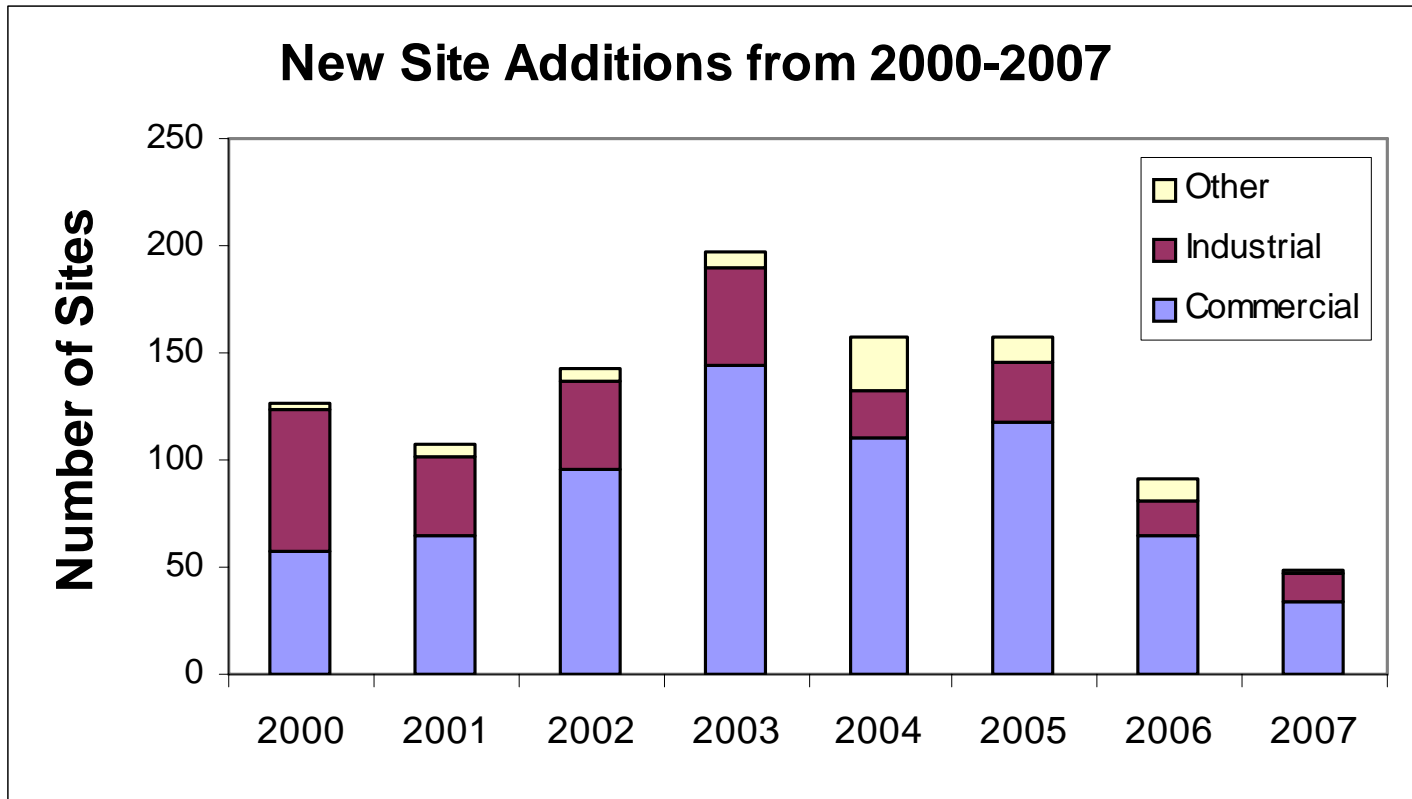
Top 5 Virginia CHP Applications

Application	# Sites	Capacity (MW)
Chemicals	11	1,281
Paper	5	304
National Security/Military	4	79
Furniture	3	67
Textiles	2	136

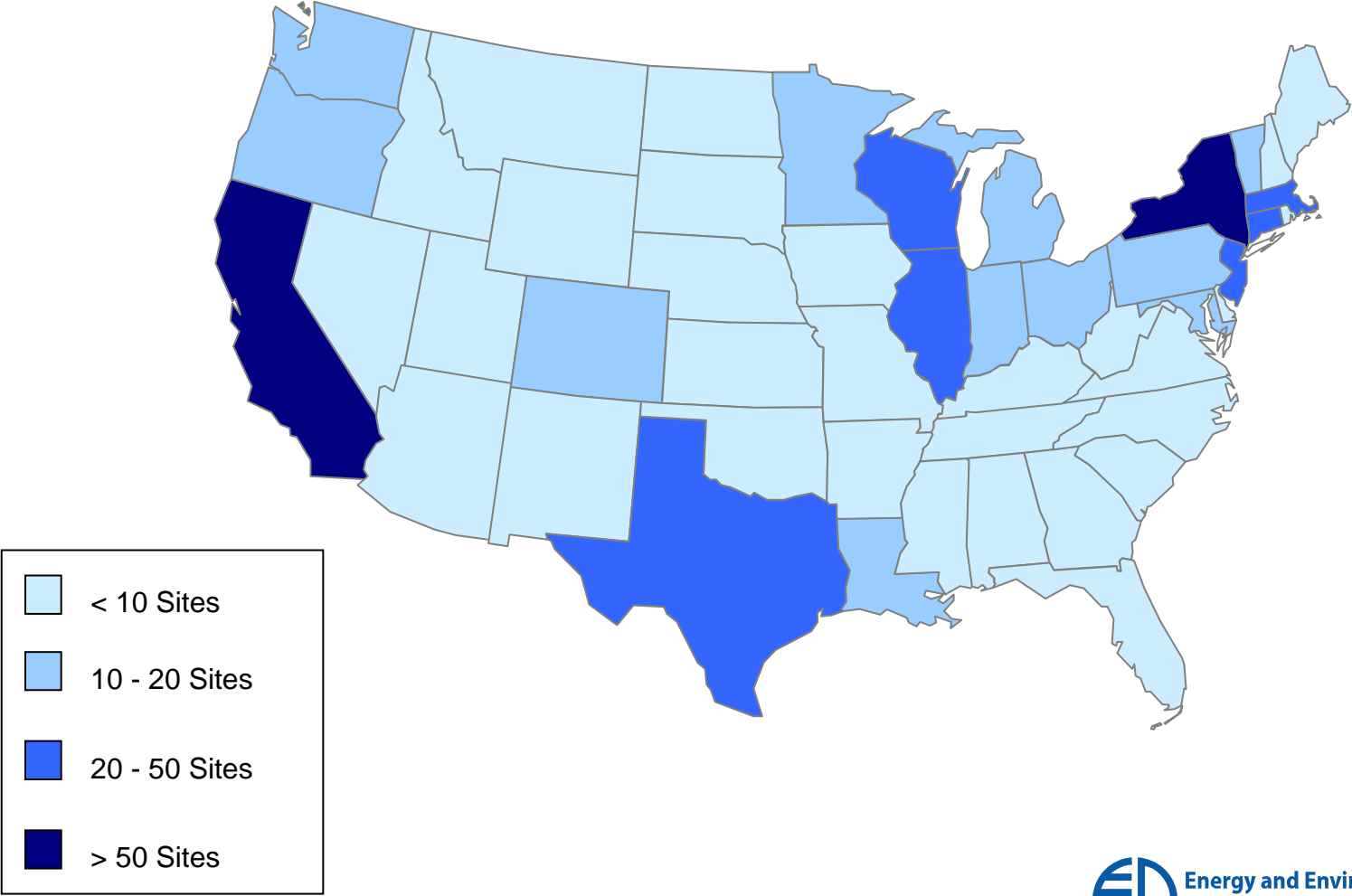
U.S. Capacity Additions: 2000 - 2007



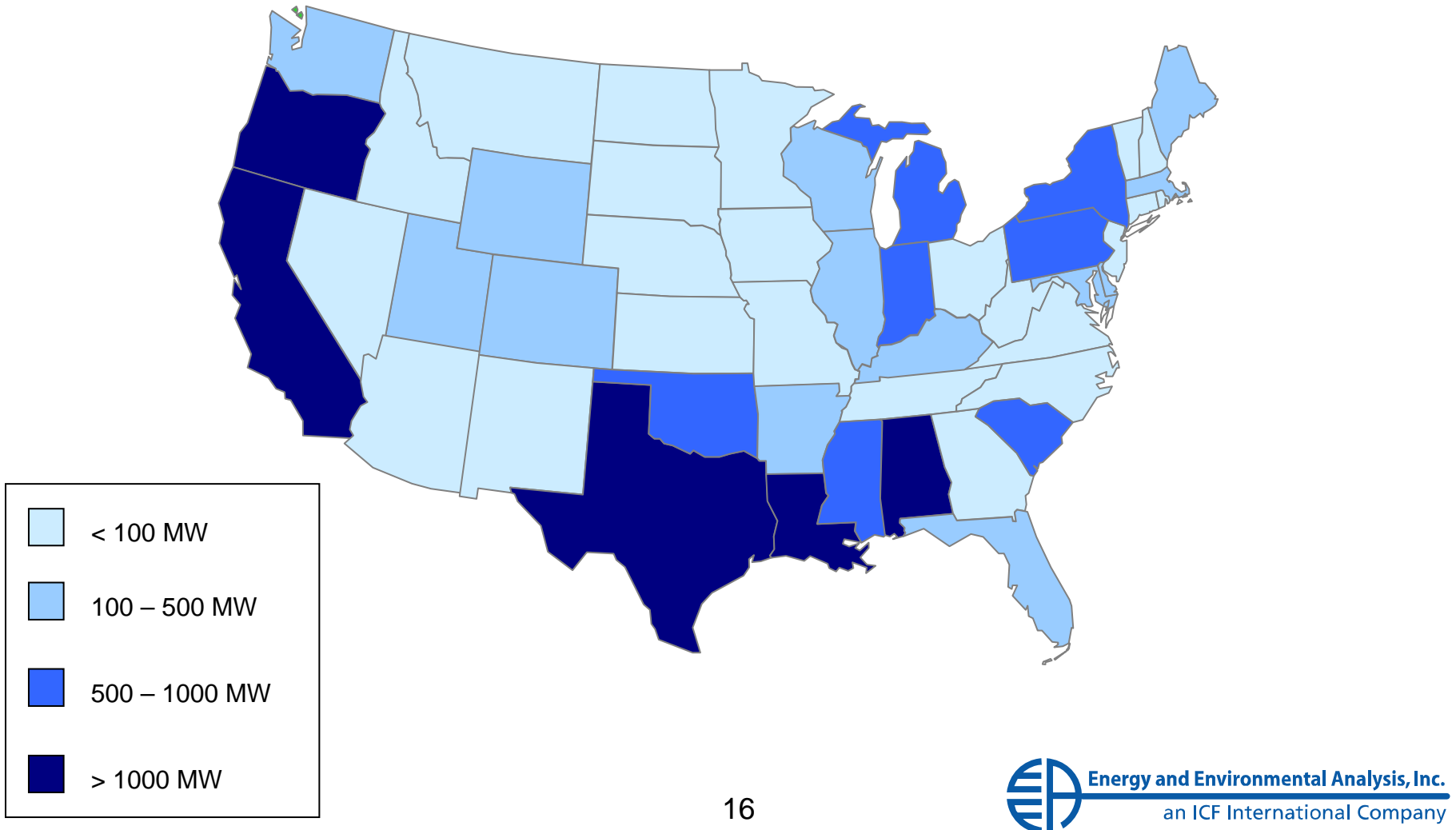
U.S. Site Additions: 2000 - 2007



CHP Site Additions by State: 2000-2007



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



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 CO₂ 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



Virginia CHP Technical Potential

- Industrial CHP Technical Potential
 - 1,308 Sites
 - 3,433 MW
- Commercial/Institutional CHP Technical Potential
 - 11,065 Sites
 - 3,501 MW
 - 90% of potential is in sites under 5 MW

Barriers to CHP Development

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

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

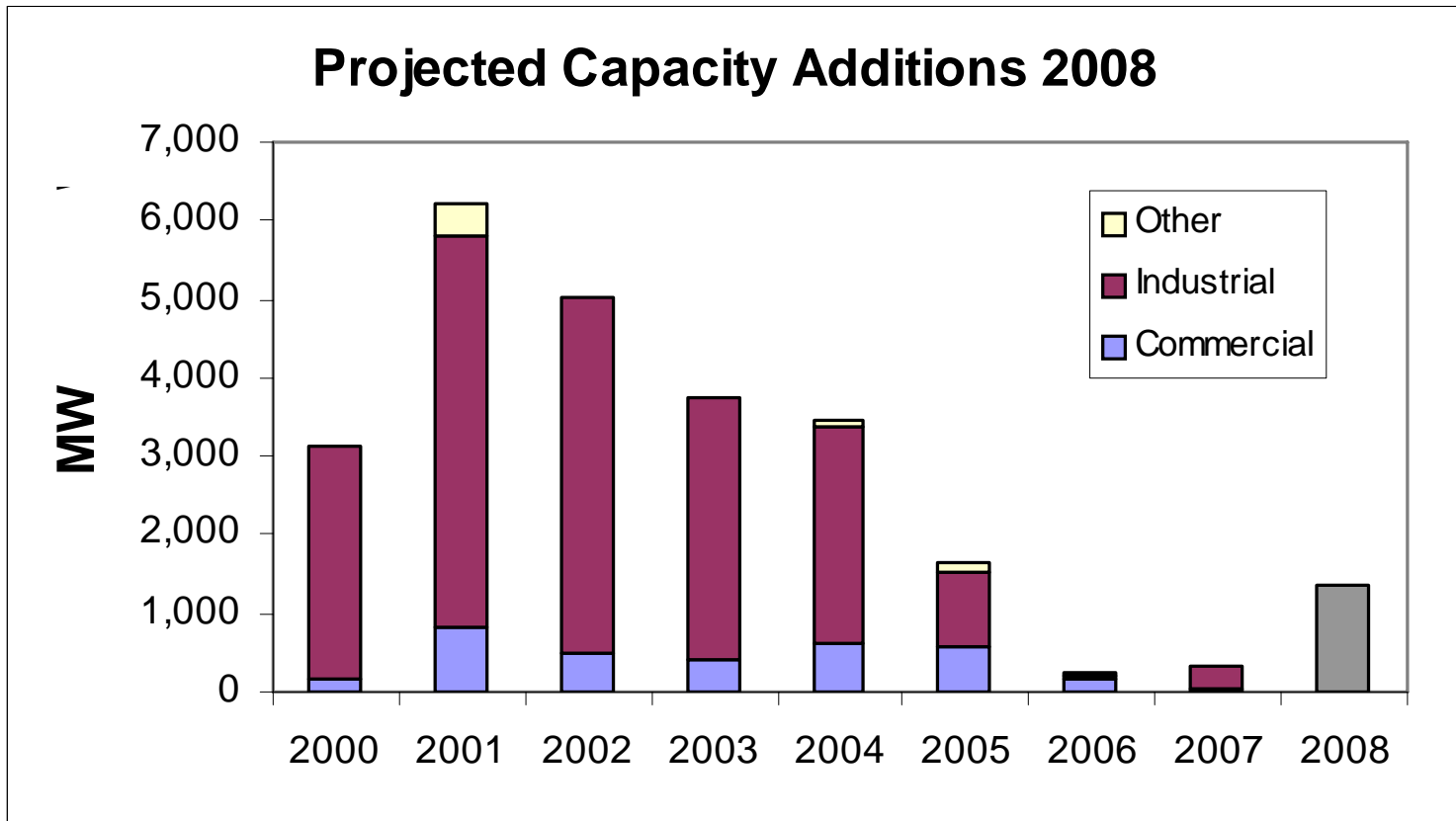
- EPA Combined Heat and Power Partnership
 - Targeted market segments
 - State policies
- DOE back in the game
 - Support for the RACs
 - Future programs
- CHP legislation
 - Energy bill
 - Investment tax credit



State Policies to Encourage CHP

- Output-based emissions standards with thermal credit
 - California
 - Texas
- State-of-the-art Interconnection Standards
 - California
 - New York
 - Texas
- CHP incentives
 - California
 - New Jersey
- CHP Included in Energy Portfolio Standards
 - Connecticut
 - Pennsylvania
 - North Carolina

Projected CHP Additions: 2008



Questions?

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