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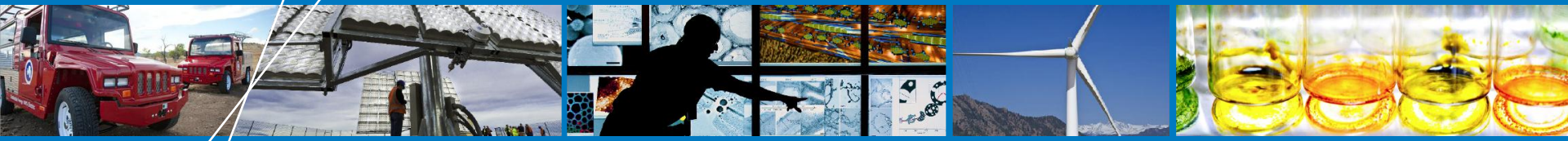
ERGIS
Generation Working Group Meeting 2



April 25, 2013

NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.

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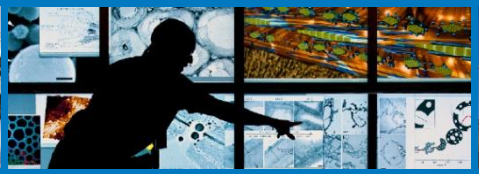
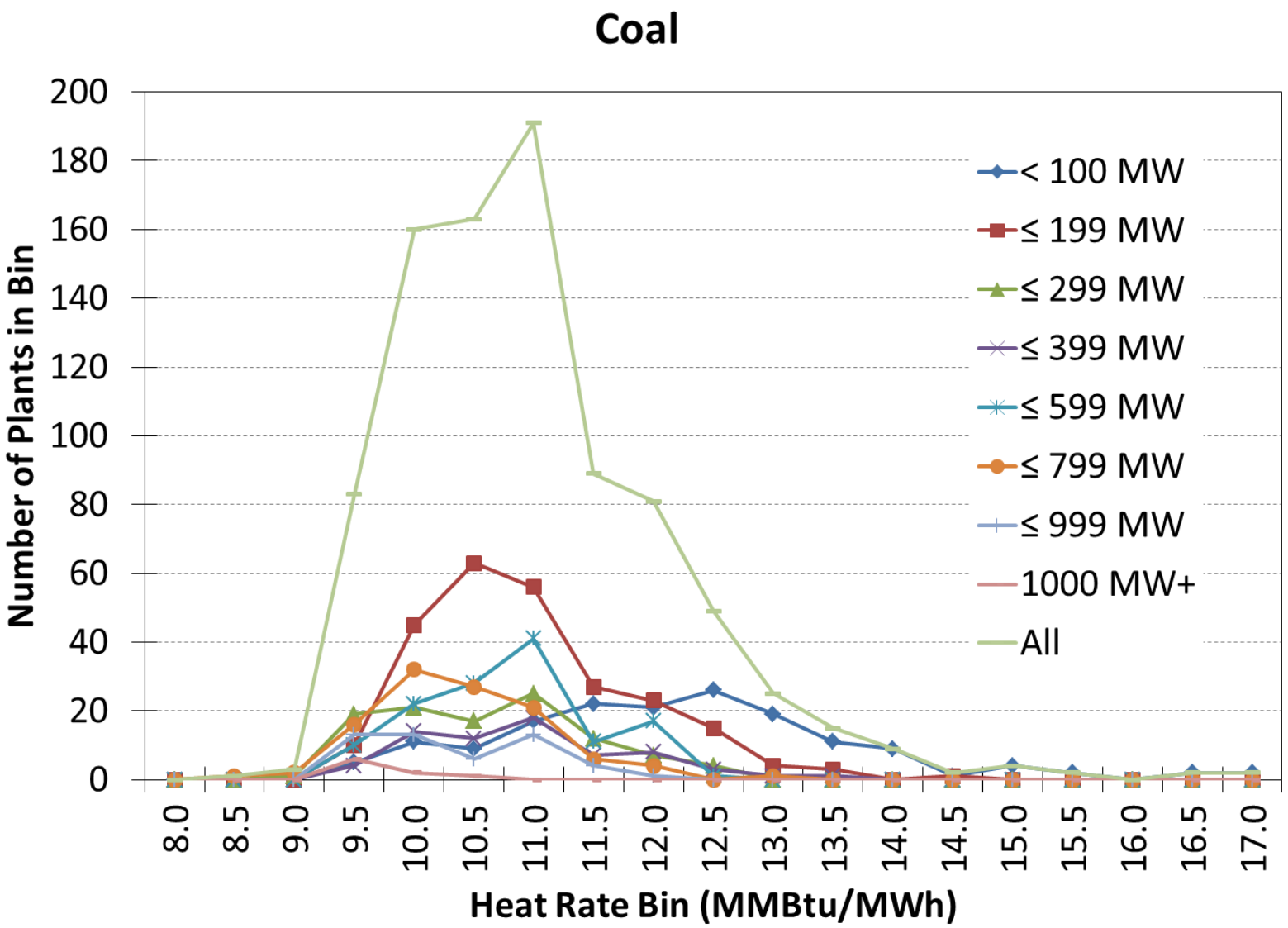
Review of Meeting 1



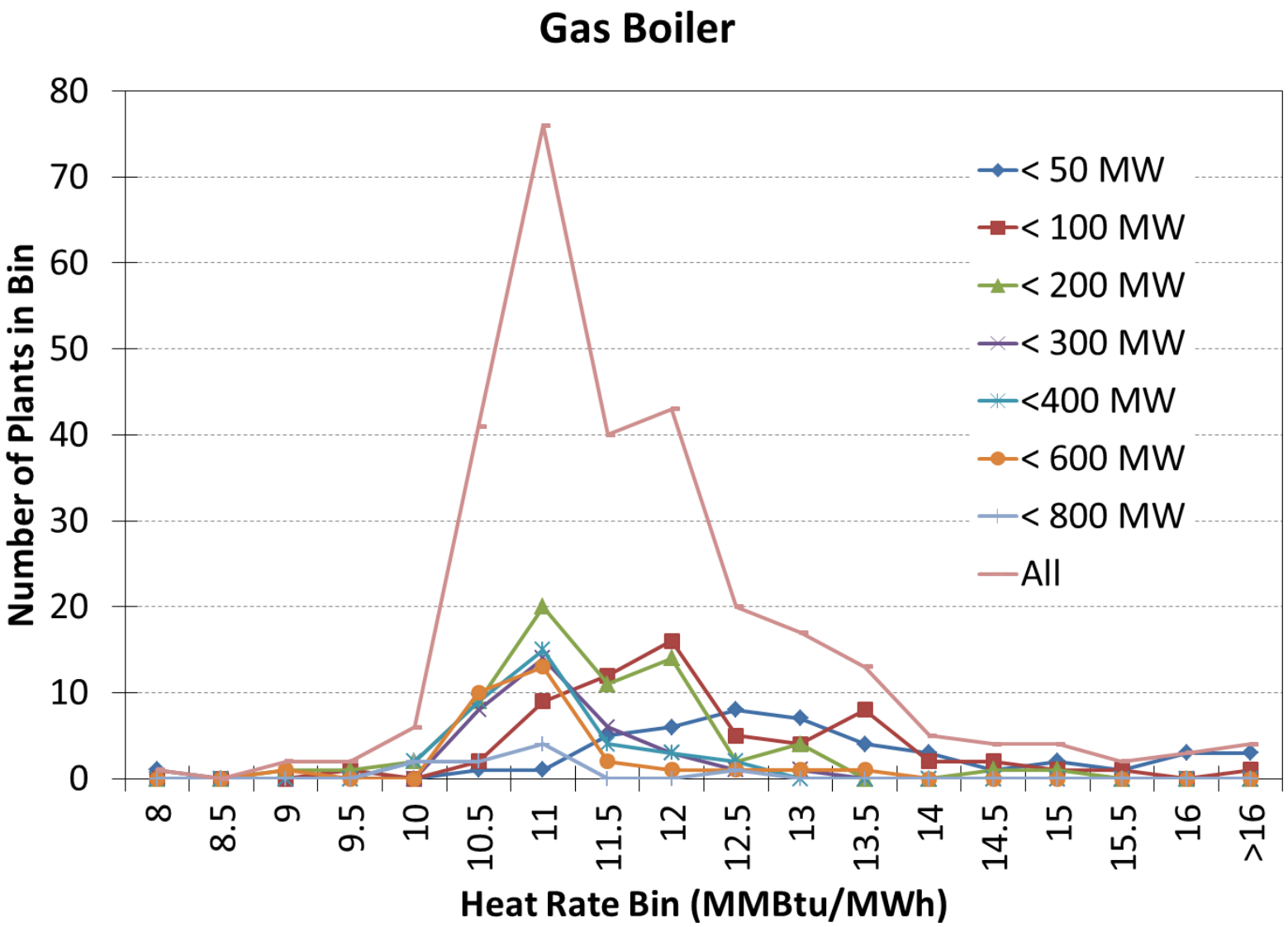
Thermal Generator Full-Load Heat Rates

- Use heat rates calculated from EPA CEMS data
- Use actual data when generators can be matched between PLEXOS and CEMS databases
- Maintain distribution of heat rates when matches are not possible

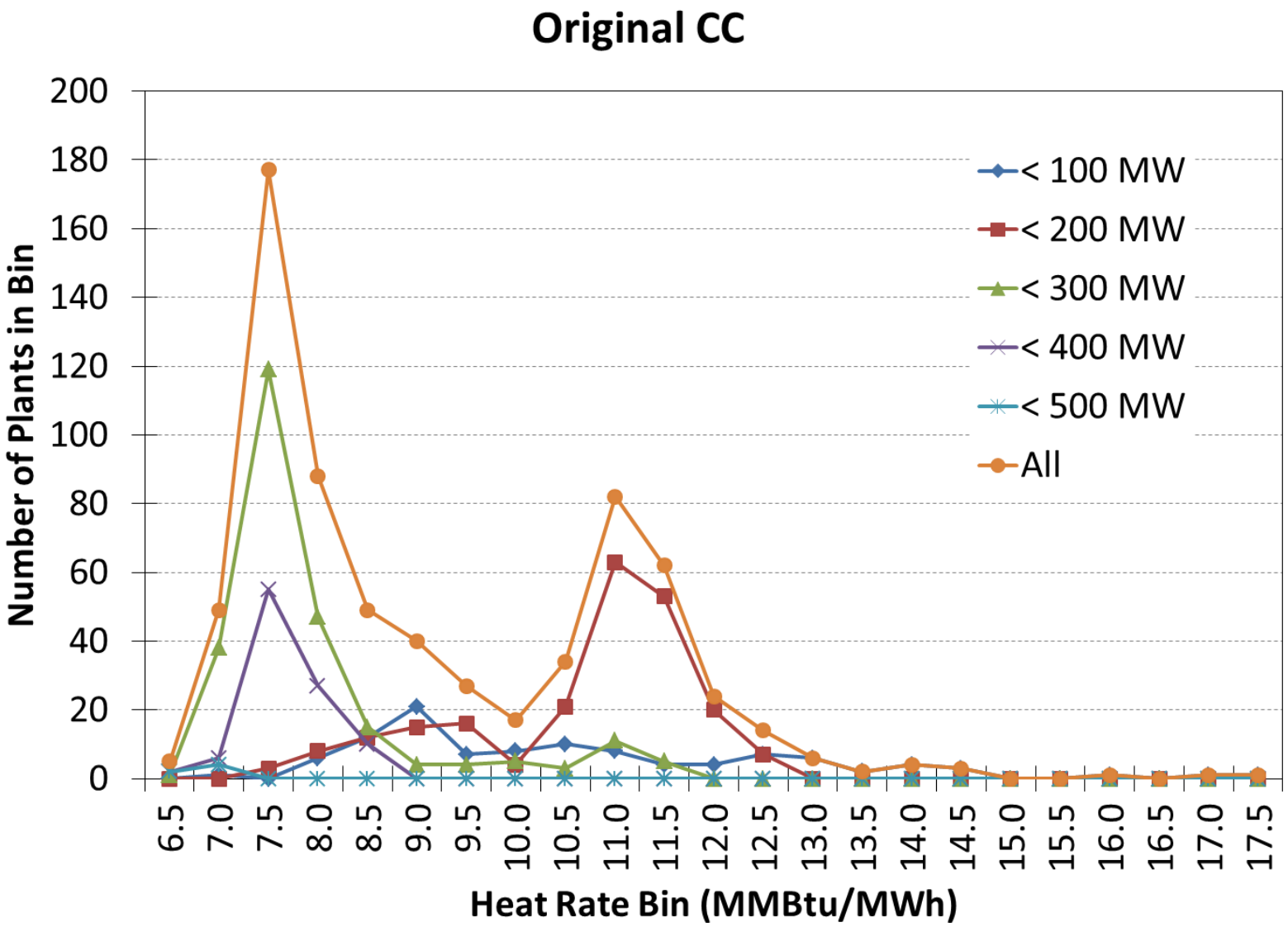
Heat Rate Distributions



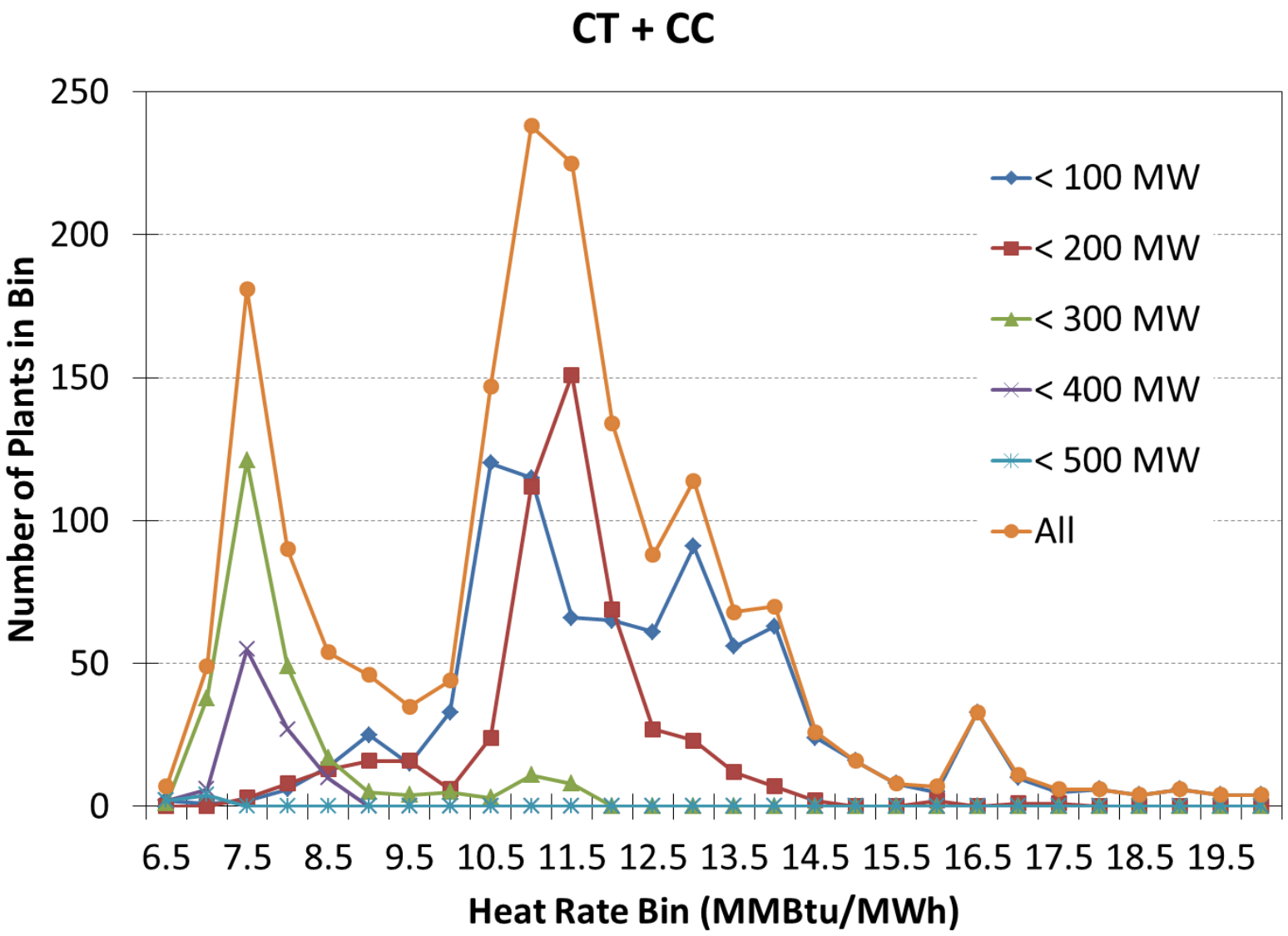
Heat Rate Distributions



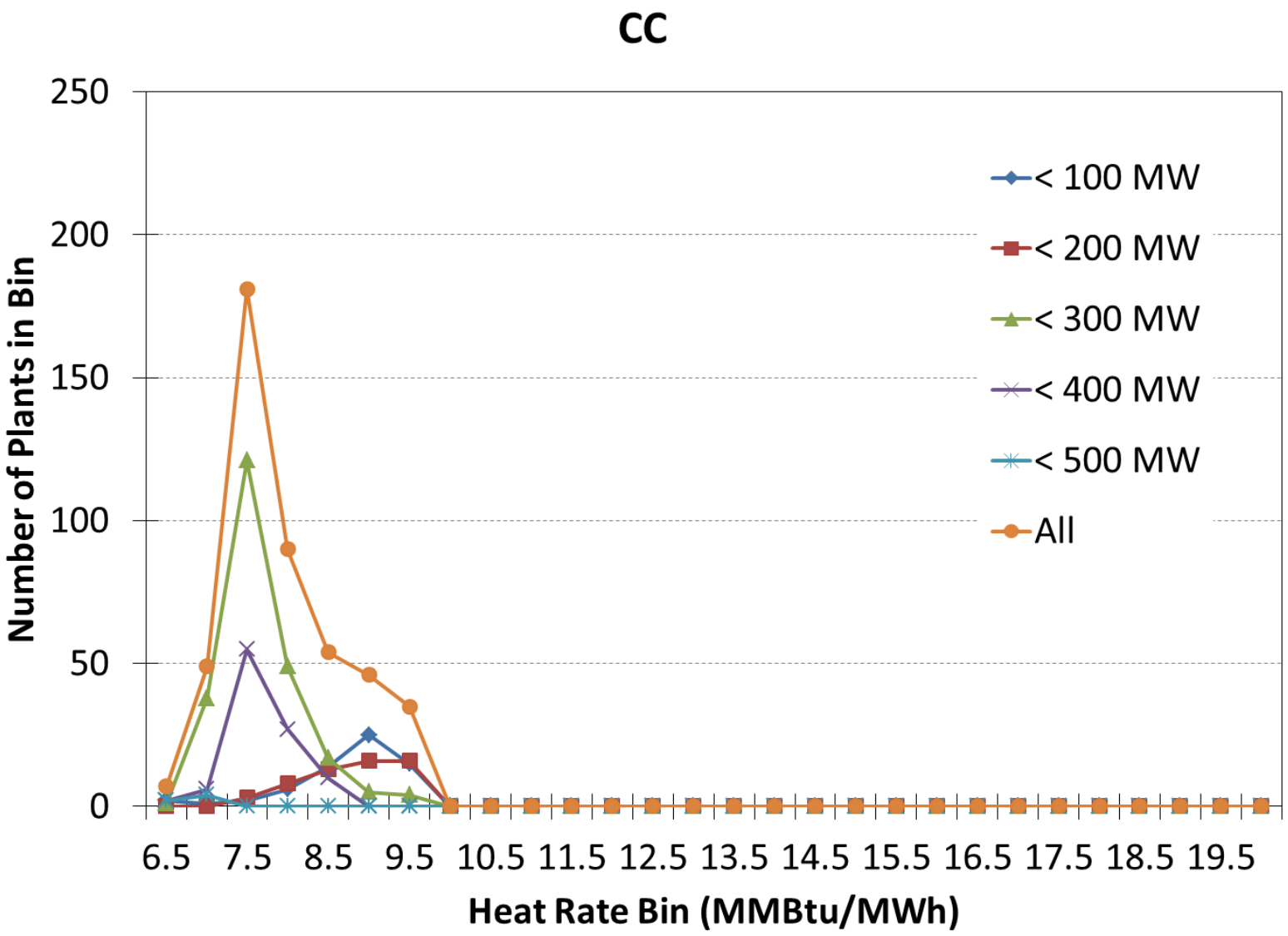
Heat Rate Distributions



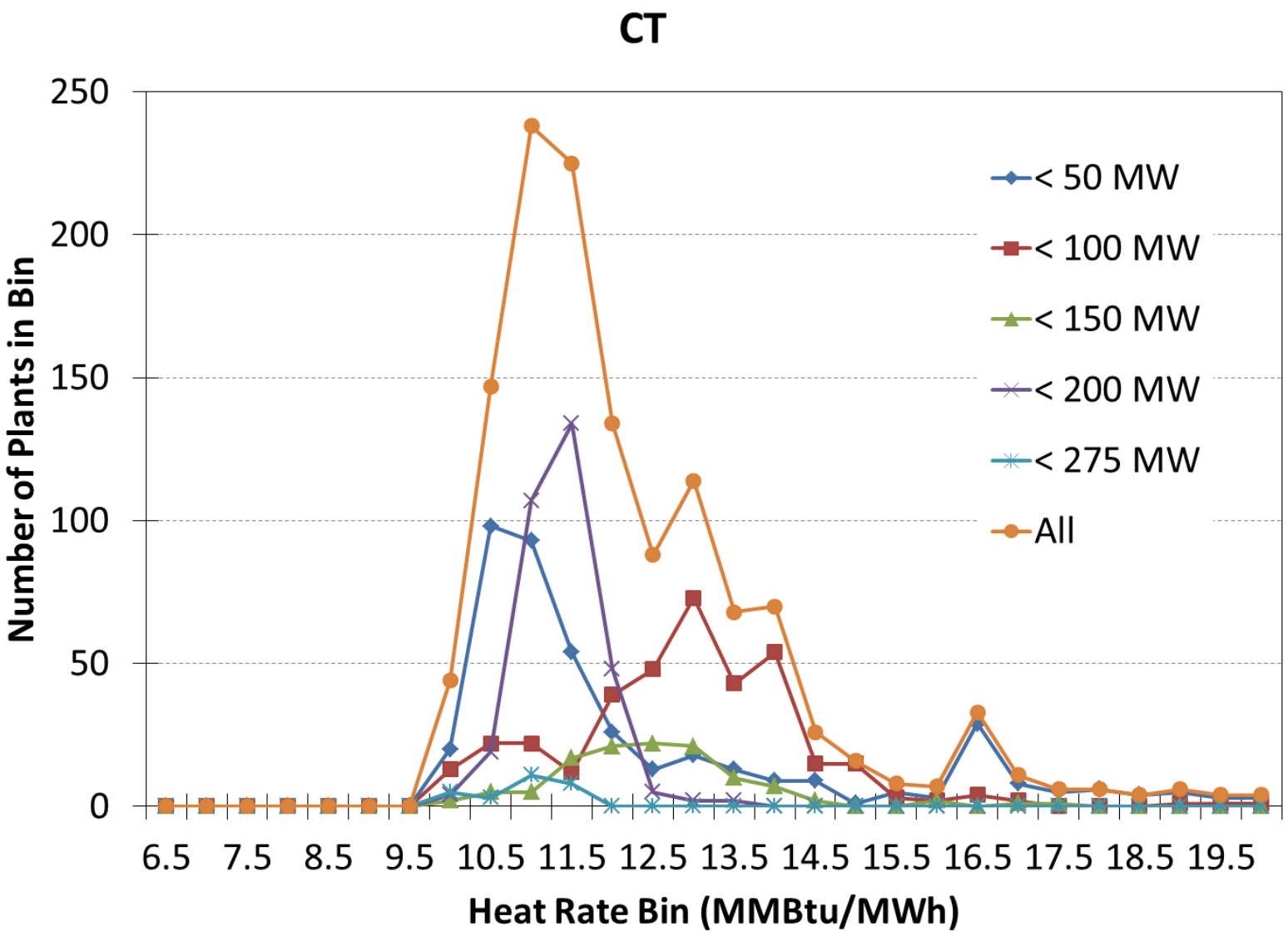
Heat Rate Distributions



Heat Rate Distributions



Heat Rate Distributions



Heat Rates: Conclusion

- **Can apply distributions by generator type and size**

Other Issues

- **Outage Rates and Durations**
  - Will use GADS data
  - Forced and planned outage rates and durations by plant type and size
- **Intertek APTECH**
  - Methodology does consider cost of maintenance contracts and assigns it to fixed O&M, variable O&M, or startup cost depending on terms of contract
- **Billion Ton Study: biomass price $3.75/MMBtu**

Reducing Run Times

- Aggregation of units at multi-unit plants up to about 100 MW aggregated capacity
- Commit nuclear, hydro, wind, and solar generators
- Database update
- Hardware upgrades

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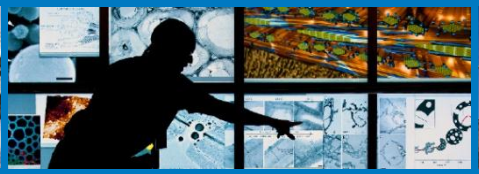
Meeting 1 Discussion



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2020 Thermal Fleet

Comparing Futures

- EIA AEO 2013
- IHS Global Insight (IHSGI)
- Inter-industry Forecasting Project at the University of Maryland (INFORUM)
- ICF International (ICF)
- Energy Venture Analysis (EVA)
- http://www.eia.gov/forecasts/aeo/table_11.cfm

Forecasts

- **Generation Forecasts**
  - IHSGI
  - ICF
  - AEO2013
  - NREL
- **Forecasts do no align with ERGIS study year**
  - 2025
  - 2035
  - 2045

AEO 2013 Reference

- Coal continues to represent the largest share of generation in 2025
- No Carbon Assumptions

IHSGI

- Natural Gas is largest share of generation in 2025

2025 Capacity and Deactivations

Active Capacity Nationwide (GW)

Projection	2011	AEO2013	EVA	IHSGI	ICF	NREL*
Coal	318	276	255	278	249	273
Oil and natural gas	463	500	568	555	546	515

Deactivations Nationwide (GW)

Projection	AEO2013	EVA	IHSGI	ICF	NREL*
Coal	49	73	46	73	33
Oil and natural gas	32	73	36	29	69
Nuclear	1	3	1	3	0

EIPC Approach

- **EIPC**
  - 2030
  - Product of NEEMs analysis
    - Identified Region and size
    - Not where in the system
  - Method: Deactivation
    - Age
    - Size
    - Features

EIPC Results

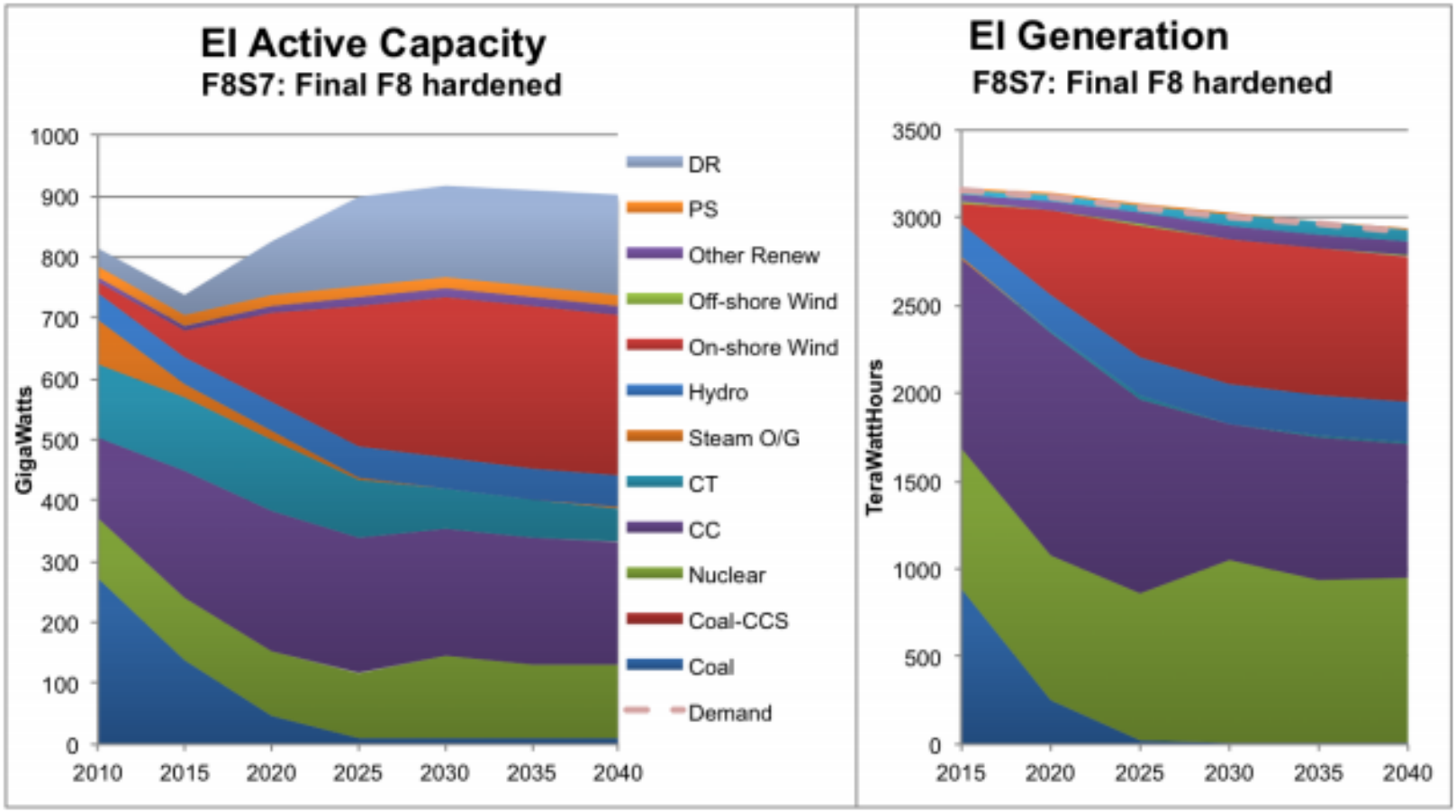


Figure 12: Scenario 1: Nationally-Implemented Federal Carbon Constraint with Increased Energy Efficiency/Demand Response (F8S7)

- **Source: EIPC Phase 1 Report page 71**

EIPC Results

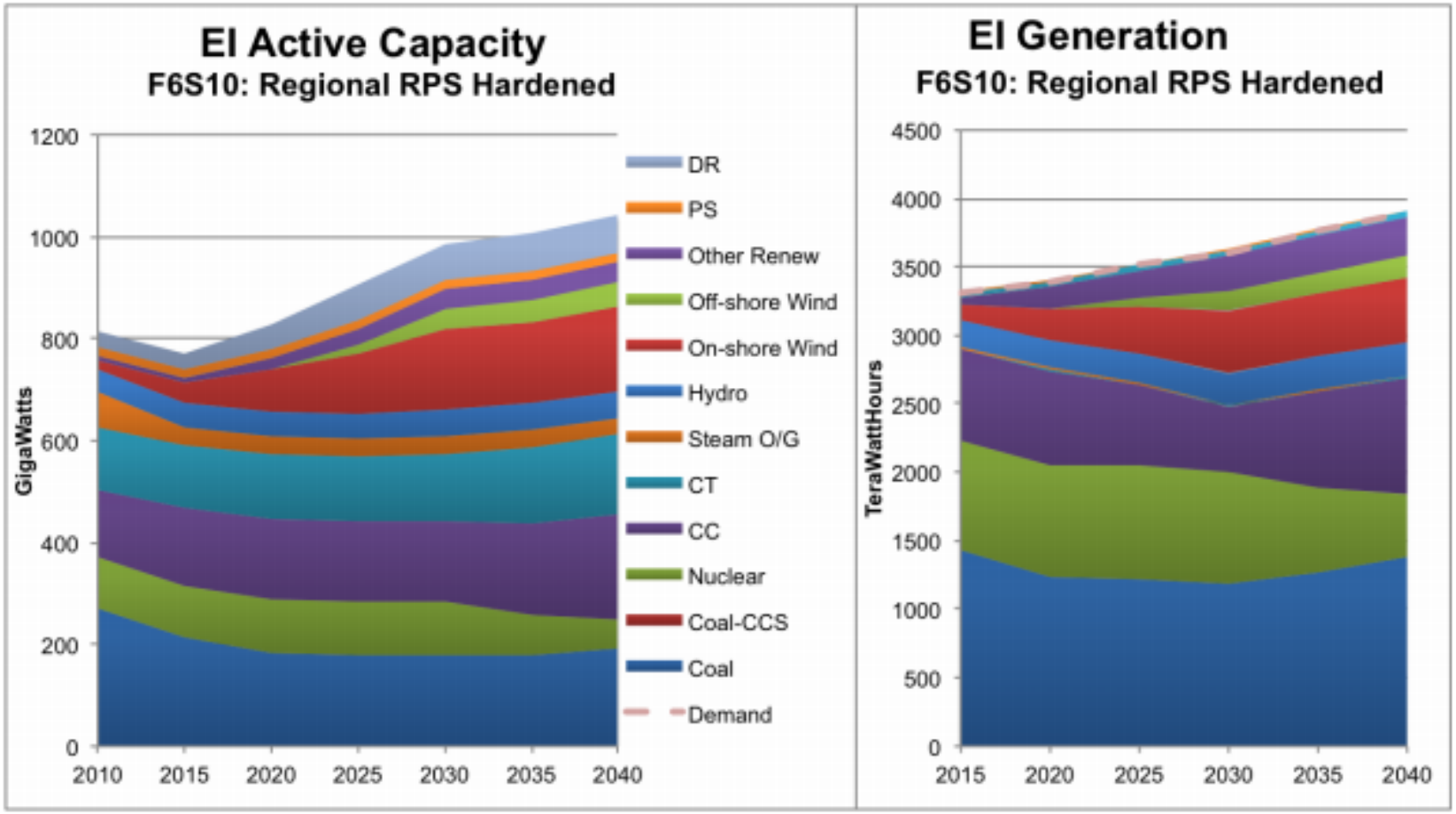


Figure 13: Scenario 2: Regionally-Implemented National Renewable Portfolio Standard (F6S10)

- **Source: EIPC Phase 1 Report page 72**

EIPC Results

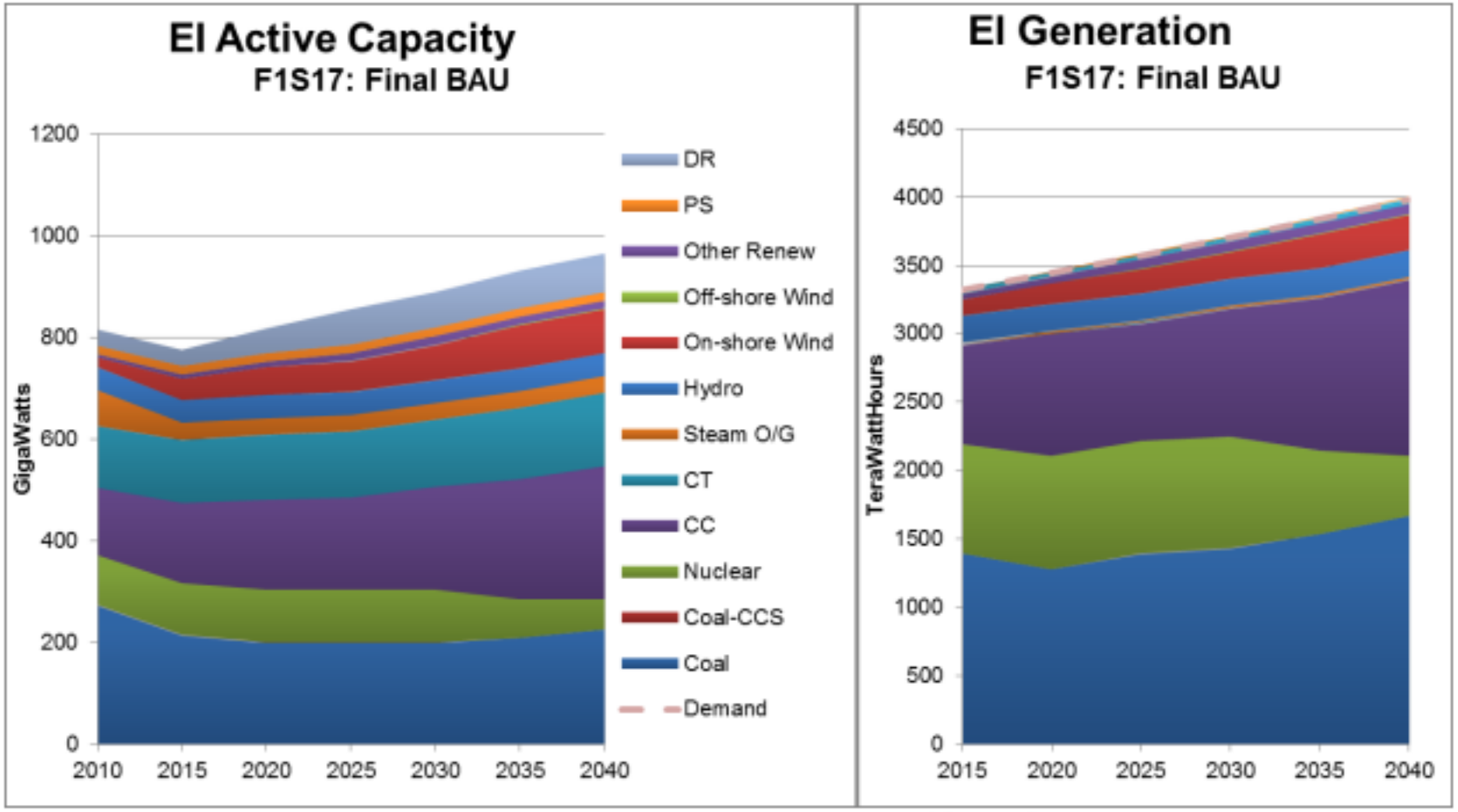


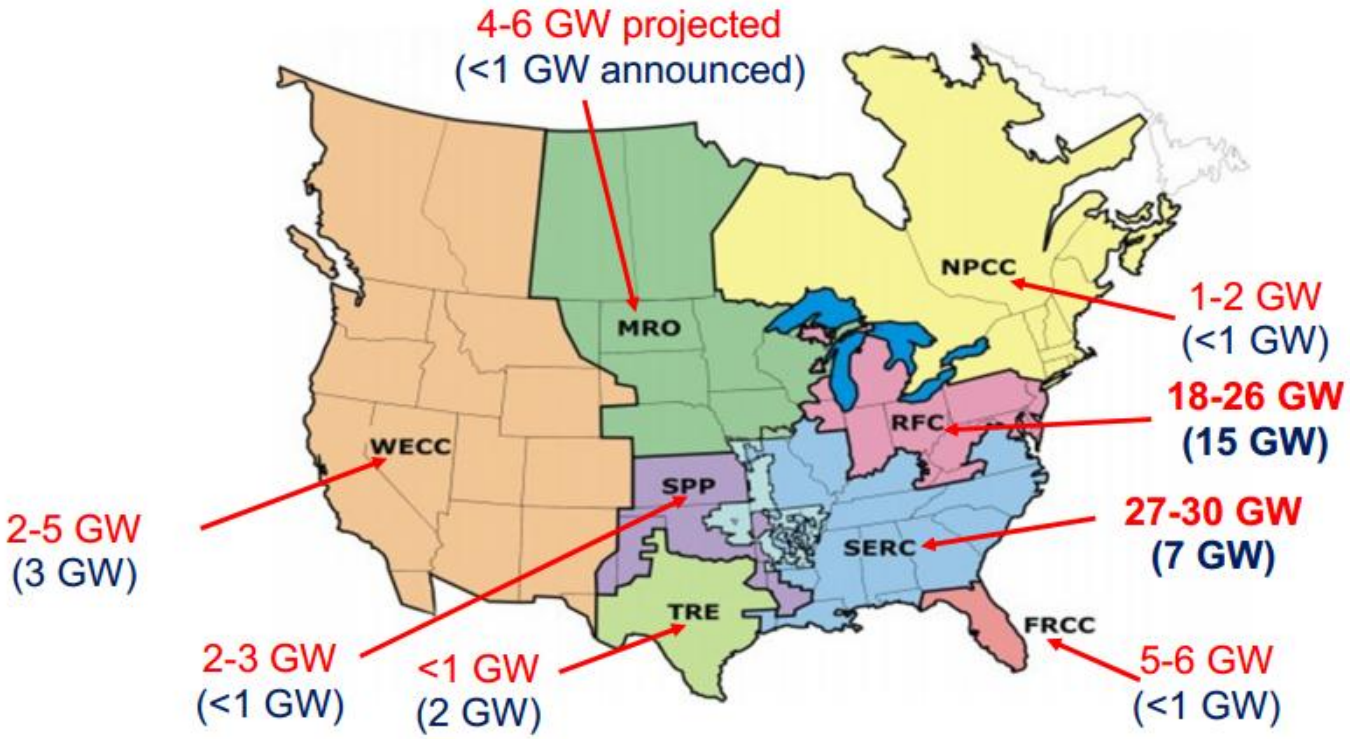
Figure 14: Scenario 3: Business As Usual (F1S17)

- **Source: EIPC Phase 1 Report page 73**

Brattle Group

- **Coal Retirements 2012 Report for 2016**
  - EI Coal retirements between 57 and 73 GW

Figure 4 **Announced and Projected Coal Retirements by NERC Region**



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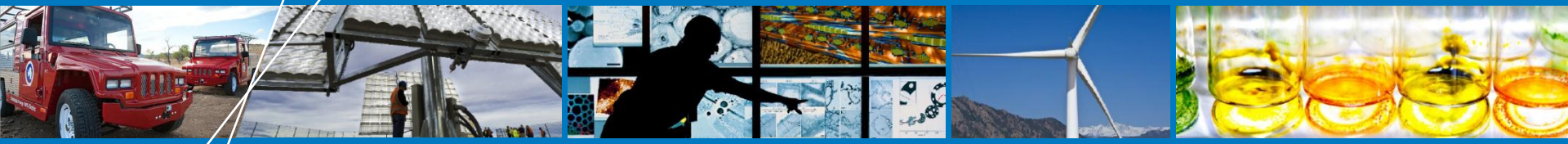
ReEDS Results for ERGIS non-Wind, non-Solar Generators



ReEDS Assumptions for ERGIS

- **Natural gas price**
  - $6.44/MMBtu (2004 dollars)
  - About $8/MMBtu (2013 dollars)
- **Retirements**
  - Plants retired if minimum capacity factor not maintained (depends on plant type)
  - Plants retired after a given number of years of operation (service life) based on original build date
- **Planning reserve requirement by NERC region (average is about 15%)**

ReEDS Non-Wind/Non-Solar Results

- **Retirement of coal and oil/gas boiler capacity**
  - 67 GW coal retirements (26% of coal capacity)
    - Mostly unscrubbed units
  - 14 GW oil/gas boiler retirements (22% of capacity)
- **Expansion of CT and CC capacity**
  - 8–16 GW new CT builds (7–14% of CT capacity)
  - 21–23 GW of new CC builds (16–17% of CC capacity)
- **No nuclear or hydro retirements**

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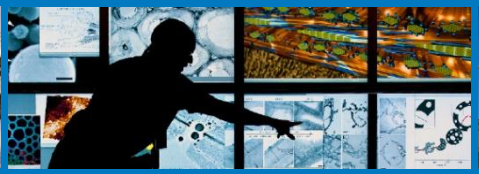
Discussion



Discussion

- Propose to use ReEDS results to identify capacity replacements
- New thermal units will be gas
- Unit deactivation will be based on heat rate

Next Steps

- Do we need another Generation WG Meeting?
- Next TRC is tentatively planned for June 19 in DC, the day after EIA Energy Conference
- Other Working Groups

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