State Level Perspectives on the Clean Power Plan

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Key Takeaways

- No one CPP target is right for every state
  - Some states have a clear-cut choice, other states’ choices dependent upon gas price path, planned coal retirements, other sensitivities

- Markets for allowances and ERCs could reduce compliance costs, but potential variability in prices creates risks for states’ own compliance investments

- Cost of compliance highly sensitive to states’ planned investments/retirements absent the CPP
US-REGEN 48 State Version: EPRI’s In-House Electric Sector Model for CPP Modeling

Capacity Expansion Economic Model, Long Horizon to 2050

State Level Resolution for Policy and Regulation Analysis

Innovative Algorithm to Capture Wind, Solar, & Load Correlations in a Long-Horizon Model
US-REGEN Models Four Main Compliance Pathways

- **Rate**
  - Subcategory Rates
    - Steam units target of 1305 lb/MWh, NGCC units target of 771 lb/MWh (2030)
  - State Rate
    - Steam and NGCC units target equal to the state rate
- **CPP Path**
  - Cap Existing and New Units
    - Existing and New Steam and NGCC units emit less than the state mass target + the new source complement target
- **Mass**
  - Cap Existing Units Only*
    - Existing and Steam and NGCC units emit less than the state mass target

* US-REGEN modeling of existing mass target is based upon the proposed Federal Plan.
What If Each State Were An Island For CPP Compliance?

Each state must comply relying solely on resources within its own boundary; power flows limited to levels in reference case
Emission Rate Credit (ERC)/Allowance Prices for 2030 with Full Island Compliance (Low gas price path)

State rate/mass path based on minimum costs of island compliance (based on present value of compliance cost through 2050)

Note: for Rate states (green), prices are for ERCs in $/MWh.

For Mass states (brown) prices are for Allowances in $/metric ton.
ERC/Allowance Prices for 2030 with Full Island Compliance (High gas price path)

Note: for Rate states (green), prices are for ERCs in $/MWh, For Mass states (brown) prices are for Allowances in $/metric ton
Observations

- Simple economics of rate vs mass:
  - Rate compliance achieved with investment in renewables (wind) and energy efficiency, gas re-dispatch
  - Mass compliance achieved with investment in more gas generation
- Zero prices imply states are in compliance in 2030 (though possible need some effort to comply in other time periods)
- Low prices driven by ease of compliance, in turn driven by
  - Low price of natural gas
  - Low incremental cost of wind (in high-wind states)
  - Energy efficiency credits from existing EE programs
  - Announced/expected post 2012 coal retirements
- Many states at/near compliance for both Rate and Mass paths
Example Analysis for State X
State X Reference Case Generation

Ref Generation (StateX)

- EE + Price Response
- New Solar
- Ex Solar
- New Wind
- Ex Wind
- Hydro
- Gas Turbine
- CCS Gas
- New NGCC
- Ex NGCC
- New NGCC
- Ex NGCC
- CCS Coal
- New Coal
- Ex Coal
- Other
- Geothermal
- New Nuclear
- Ex Nuclear
- Scenario Load

TWh

2015 2020 2025 2030 2035 2040 2045 2050
CPP Compliance as an Island Requires Overhaul of the Generation Mix for Either Rate or Mass Pathways

Generation 2030 (StateX)

Ref

RUi

MXi

More Use of Coal

New wind

New NGCC

TWh

Coal

Gas Turbine

CCS Coal

CCS Gas

Ex. NGCC

New NGCC

Gas Turbine

CCS Gas

Ex. NGCC

New NGCC

Coal

Nuclear

Hydro / Geo

Ex. Wind

New Wind

New Solar

EE

Other

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Island Compliance Depends on New Investment in Wind (for Rate Path) or New NGCC (for Mass Path)

Cumulative Capacity Additions in 2030 (StateX)
Compliance with Trading

- Opportunity to reduce cost
- Trade-off is reliance on a market
  - Slow to develop?
  - Liquidity?
  - Exposure to additional external forces
  - Lower volatility?
- Different mixes of rate/mass compliance from other states will impact market prices and the value of trading for StateX
Investment Needed for Compliance

2030 Cumulative Generation Additions (GW)

- StX-Rate Island
- StX-Mass Mix1
- StX-Rate Mix2
- StX-Mass Mix5

- NGCC
- Wind
Strategic Insights

- Key decisions for states are Rate vs. Mass, but also how much to rely on participation in the market
- Some states appear to have lower costs with Rate, some for Mass, no single universal lowest-cost choice
- The future matters
  - Natural gas prices, RE and EE costs
  - Pre-CPP planned retirement/investment decisions
  - Market scope and depth
    - Supply/demand for ERCs and Allowances depends on individual state choices for Rate vs. Mass
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