

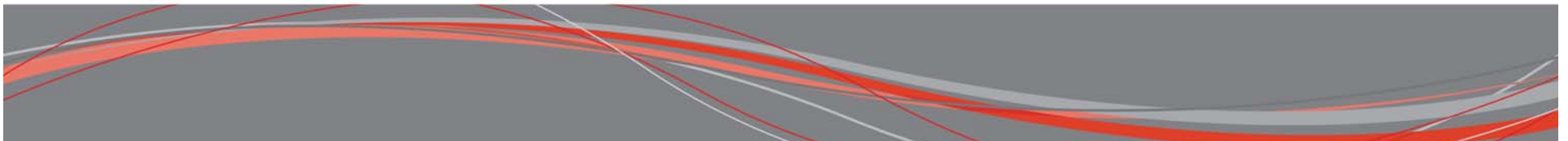


# Carbon Regulation and Resource Planning

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Western Resource Planning Forum

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# Colorado Carbon Landscape

- **2004** - PUC approves PSCo IRP that proposes to include CO<sub>2</sub> in resource acquisition decisions
- **Renewable Energy Standard**
  - **2004** - RES 10% by 2015
  - **2007** - RES increased to 20% by 2020 HB 1281
  - **2010** - RES increased to 30% by 2020 HB 1001
- **Nov 2007**- Governor issues Climate Action Plan
  - Reduce GHG from 2005 levels by 20% by 2020 and 80% by 2050
  - Increased use of energy efficiency, renewables, and clean coal.

# CO<sub>2</sub> Applied in IRP's

- **2004 IRP** – \$9/ton (2010, 2.5% esc)
  - 800 MW wind, 750 MW supercritical coal, 600 MW of gas-fired
- **2007 IRP** – 20\$/ton (2010, 7% esc)
  - 700 MW wind, 300 MW solar, 900 MW gas, 229 MW coal retired
- **Modeling Methodology**
  - CO<sub>2</sub> price included planning model dispatch decisions and economy energy market representation.
- **Sensitivities**
  - Least-cost plans under 'base' CO<sub>2</sub> with substantially different technology mixes are re-priced at higher and lower CO<sub>2</sub> values to test robustness

# Evaluation of Coal Unit Retirements

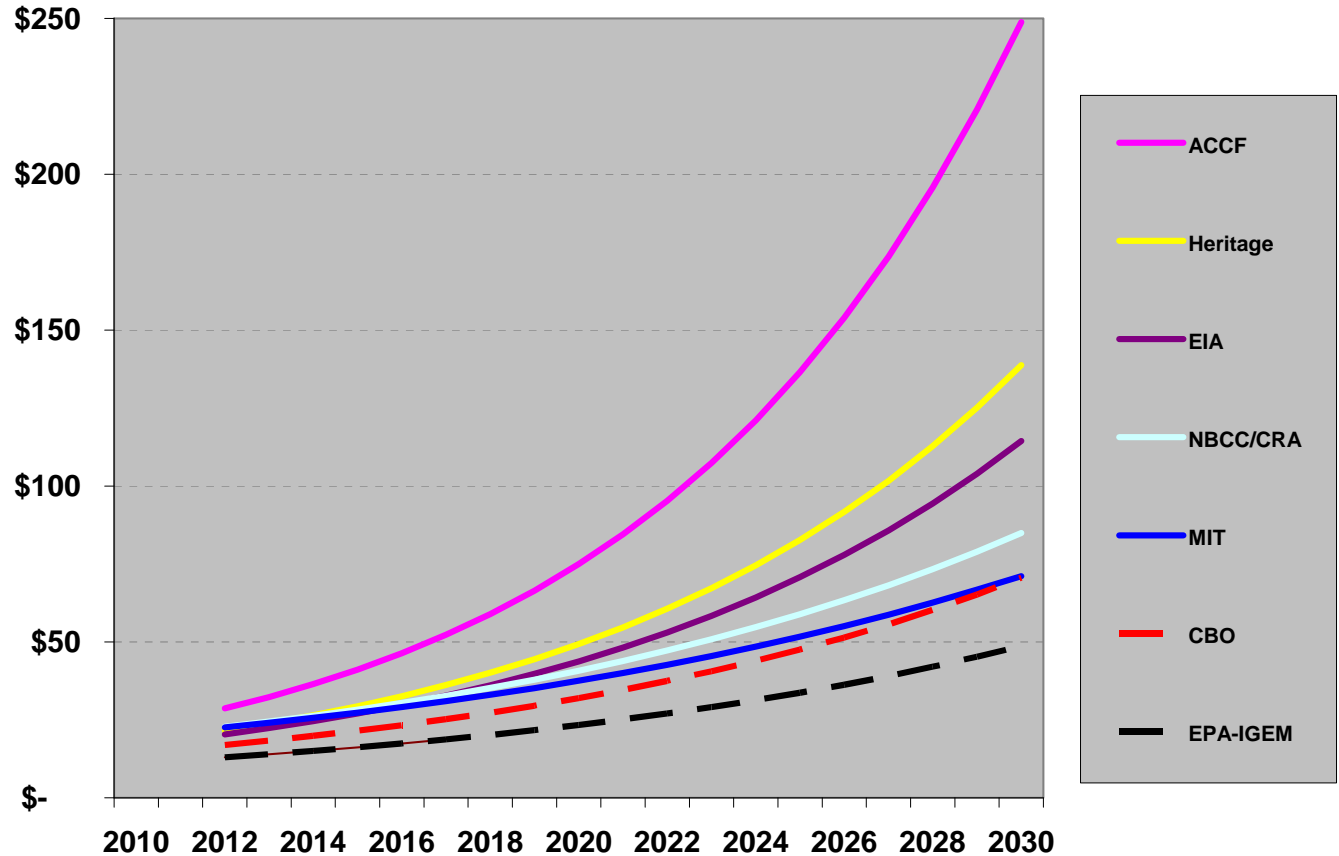
- **Retirement date influenced by:**
  - Labor Issues
  - Fuel contracts (both commodity and rail liquidated damages)
  - Capacity need after retired time to build replacement capacity
  - Transmission impacts and lead time to fix
- **Economics of Retirement**
  - Estimate life extension costs (O&M and capital)
  - Estimate likely emission control requirements
  - Determine CO<sub>2</sub> price at which life extension is cost equivalent combinations of CC, CT, and renewables.
- **Assess likelihood of resulting CO<sub>2</sub> price**
  - Analysis of proposed federal legislation and industry estimates of economic and political impacts

# Estimating CO<sub>2</sub> Price Likelihood

- Political climate
- Economic impacts on timing
- Consequences of no legislation
  - EPA regulates

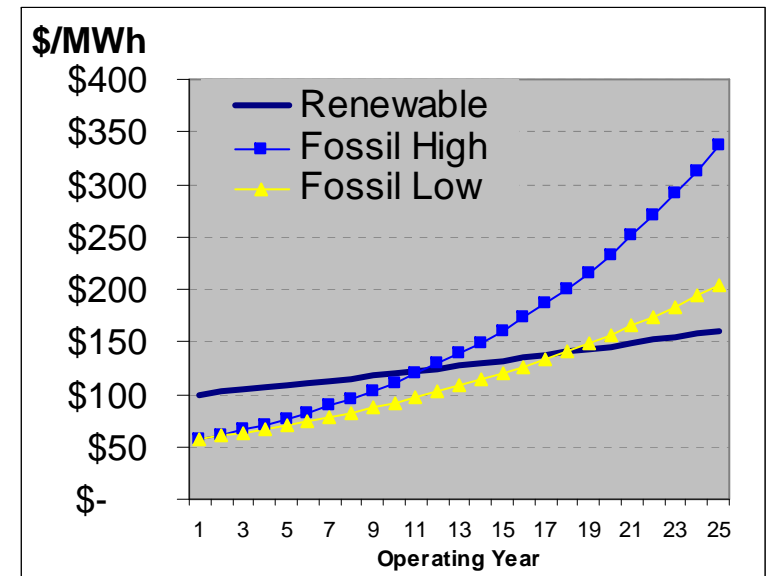
Nominal  
\$/metric ton

## Analysis of Waxman-Markey



# Planning Challenges of Carbon

- **Renewable Energy Standard Rate Caps**
  - Forecasting customer rate impact heavily influenced by CO<sub>2</sub> cost
  - Could exceed rate impact if CO<sub>2</sub> regulation delayed
  - Revenue from rate rider < cost of renewables
- **Limitations on level of Renewables**
  - Reliability (CPS1 and CPS2)
  - Coal unit cycling
- **Analyzing assets over useful life**
  - Dealing with outer year escalation
  - Can change result of PV analyses
  - Appropriate to trade near-term rate hike to avoid speculative future?



# Achieving Expected Reduction Goal

## Pros of Early Action

- Has put PSCo on path to achieve expected range of reduction goals
- Allowed for more EE to pass cost-effectiveness tests
- Captured PTC or ITC in price paid for renewables
- Operators gaining experience accommodating intermittent resources

## Cons of Early Action

- If benchmark date pushed out from 2005 to later, could lose ability to take credit for prior CO<sub>2</sub> reductions

