

Resource Planning with Carbon Legislation Uncertainty

Megan Parsons
Development Engineering
Burns & McDonnell

What's the Buzz

“How do I meet near-term load demand?”

Problem: No prudent planning approach based on expected legislation

Resource Planning Goals

- Cost effectively fulfill generation load and reserve obligations
- Diversify generation portfolio
- Manage risk to ensure financial viability
- Environmental Leadership – reduce GHGs

REQUIRES

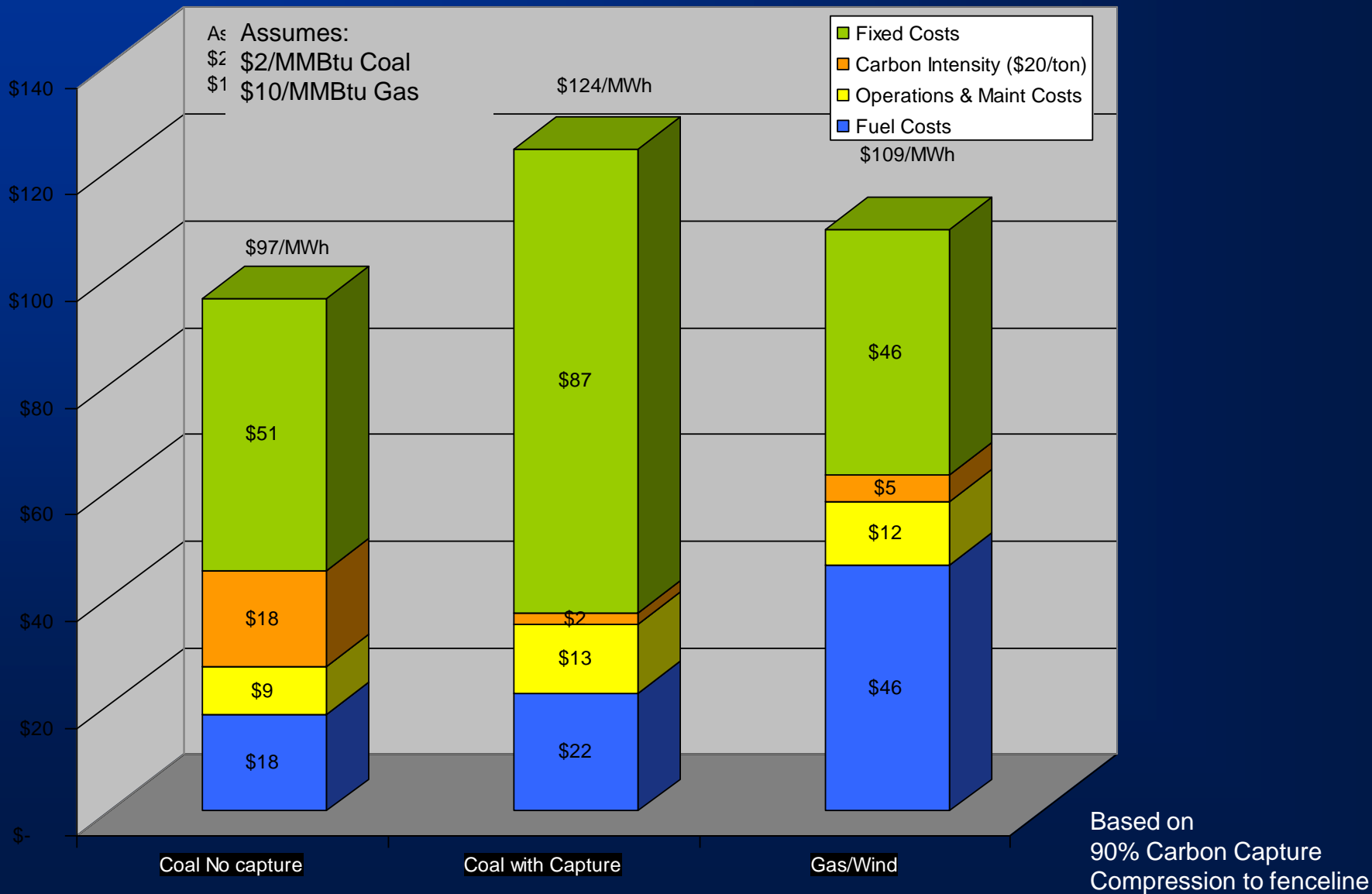
- Meet state renewable standards
- Maintain existing fleet, improve efficiency
- Evaluate cost effective resources
- Plan to meet GHG mandates

Developing the Baseline Economics

Typical baseload options considered:

- Nuclear
- Renewables
- Advanced Coal (capture ready)
- Advanced Coal (with carbon capture)
- Natural Gas
- Natural Gas/Wind Mix (SCGT/CCGT/wind)
- Wind + Energy Storage

Impact to Busbar Costs – 600 MW Case Study

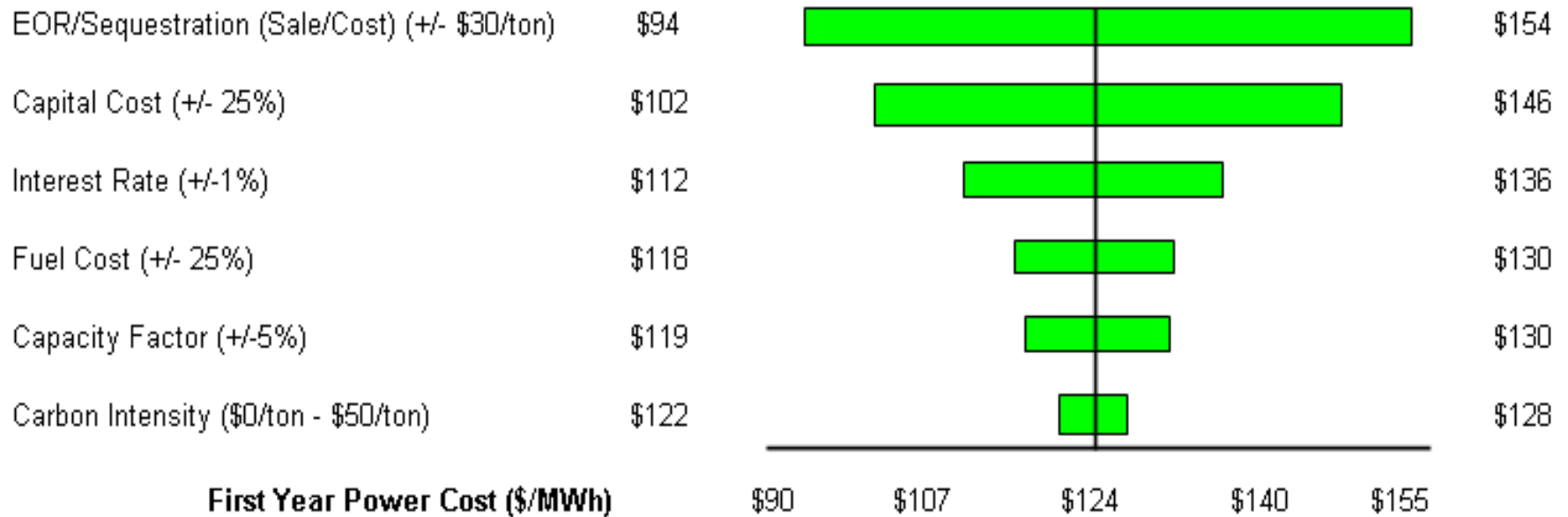


Sensitivities

- Carbon Legislation
- EOR potential – value and longevity
- Sequestration Costs
- State Renewable Standards
- Permitting schedule
- Nat gas pricing
- Coal/transportation costs
- Load Growth
- Equipment/labor costs – market impact
- Financing costs

Significantly Impact the technology selection

Example for Advanced Coal with 90% Carbon Capture



Carbon Capture Ready

- Proceed with development of PC plant, with provisions for CO₂ capture when the technology becomes available
- Continue phased development of carbon capture and EOR

Risk

Permitting: CO₂ emissions can be regulated, extreme push back from environmental groups

Political: Is the approach consistent with GHG reduction agenda?

Financing: Potential for stranded costs – difficult to access capital



Carbon Capture *Installed*

- First Generation Technology – cost and reliability uncertainty
- EOR Contracts
 - Financing may require EOR contract, EOR contract may require supply commitment, supply commitment may require financing guarantee

Geological Sequestration still unanswered

- Permitting requirements?
- CO₂ Ownership
- Insurance requirements
- Cost of sequestration
- Financing
 - Federal Loan Guarantee Potential
 - Requires high costs to develop project without guarantee on return

Where is Coal

- Load growth forecasts look down in many regions
- Coal is a struggle
 - Waiting for technology availability
 - Waiting for clear communication of carbon legislature
 - Waiting for sequestration development
 - Figuring out the EOR market
- Natural Gas to fulfill near-term generation needs
 - Impact on Gas price? Electricity costs?
- Energy Policy Uncertainty affecting energy prices