



Wage Effects on 45Q Tax Credit Participation

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Agenda

- Objective
- Section 45Q
- Prevailing Wage and Apprentice Requirements
- Approach
- Firm Production and Costs
- Estimated Firm Costs
- Estimated Carbon Capture Firm Costs
- Take-Away Points



Objective

- How prevailing wage and apprenticeship (PWA) requirements impact Electricity Generating Unit (EGU) opt-in 45Q tax credits
- Participation in the tax credit involves firms implementing carbon capture technology



Section 45Q

- Section 45Q Carbon Sequestration Credit under the Inflation Reduction Act (IRA)
 - Subsidy per metric tonne (t) of carbon captured (tCO_2)
 - 5x multiplier if PWA requirements are met
- \$17/ tCO_2 for Carbon Capture and Storage (CCS)
 - 5x multiplier if the PWA requirements are met \rightarrow \$85/ tCO_2
- \$12/ tCO_2 for Carbon Capture and Utilization (CCU)
 - 5x multiplier if the PWA requirements are met \rightarrow \$60/ tCO_2



PWA Requirements

- Prevailing Wages
 - Non-administrative
 - Fringe-benefits included
 - Wages adjusted to construction area
- Apprentice Requirements
 - Paid a % Journeyman wages
 - Wages adjusted to construction area
 - Hourly % of total labor hours (10,000 hrs.)
 - 10% before Dec 31, 2022
 - 12.5% between Dec 31, 2022, and Jan 1, 2024
 - 15% after Jan 1, 2024
 - JEDI/DEI component
 - From nongovernmental or private hiring organizations



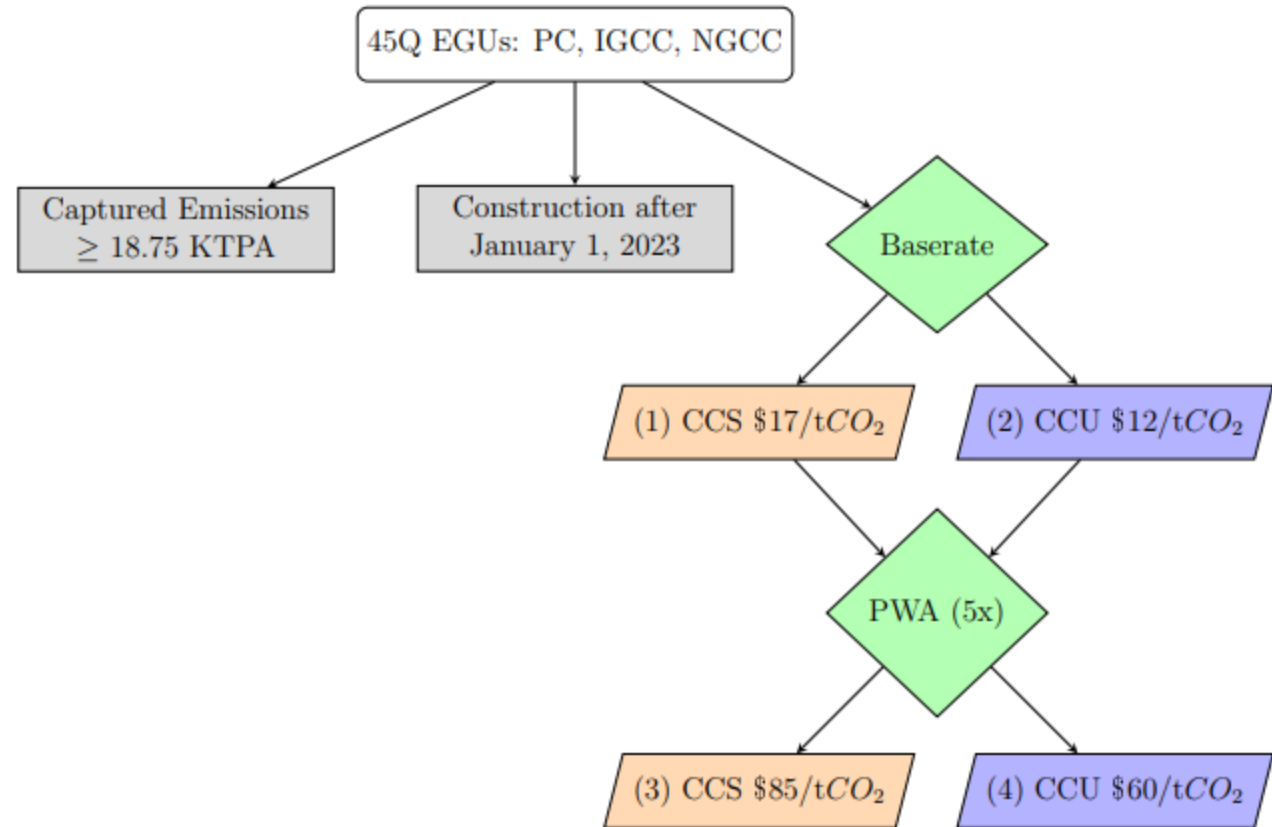
Photo Credit: [Prevailing Wage and the Inflation Reduction Act | U.S. Department of Labor \(dol.gov\)](#)



Model Scenarios

Four Modeling Scenarios:

1. CCS baserate at \$17/tCO₂
2. CCU baserate at \$12/tCO₂
3. CCS with PWA at \$85/tCO₂
4. CCU with PWA at \$60/tCO₂



KTPA: Thousand t Per Annum

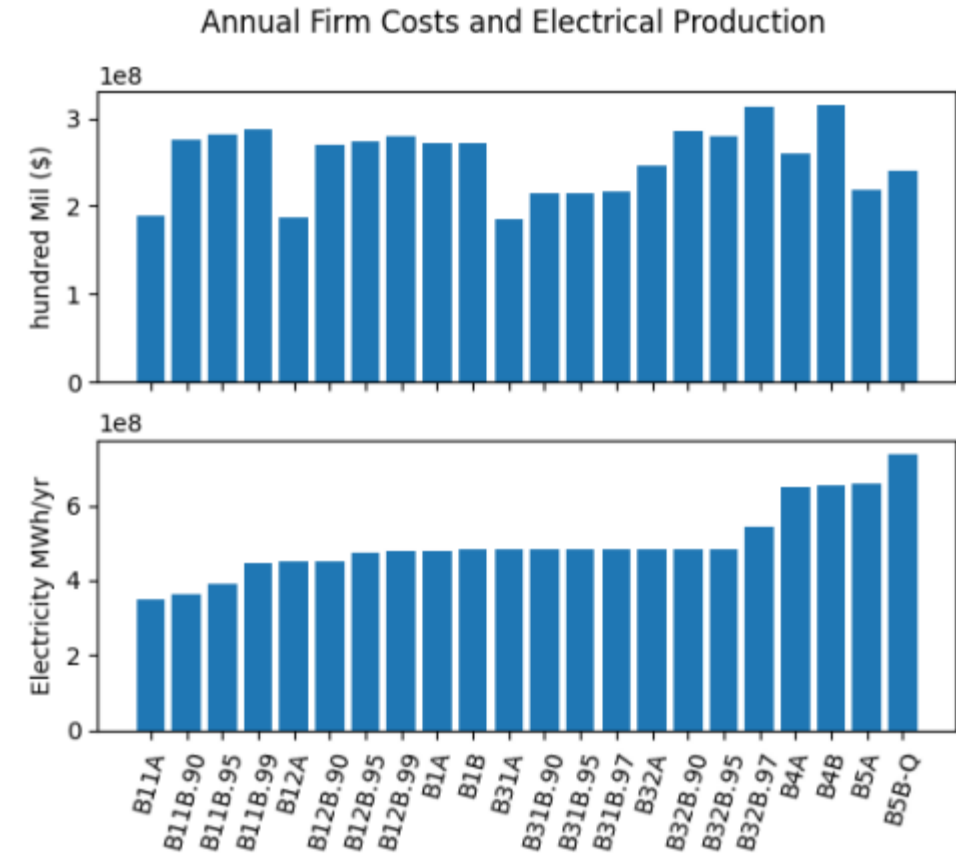
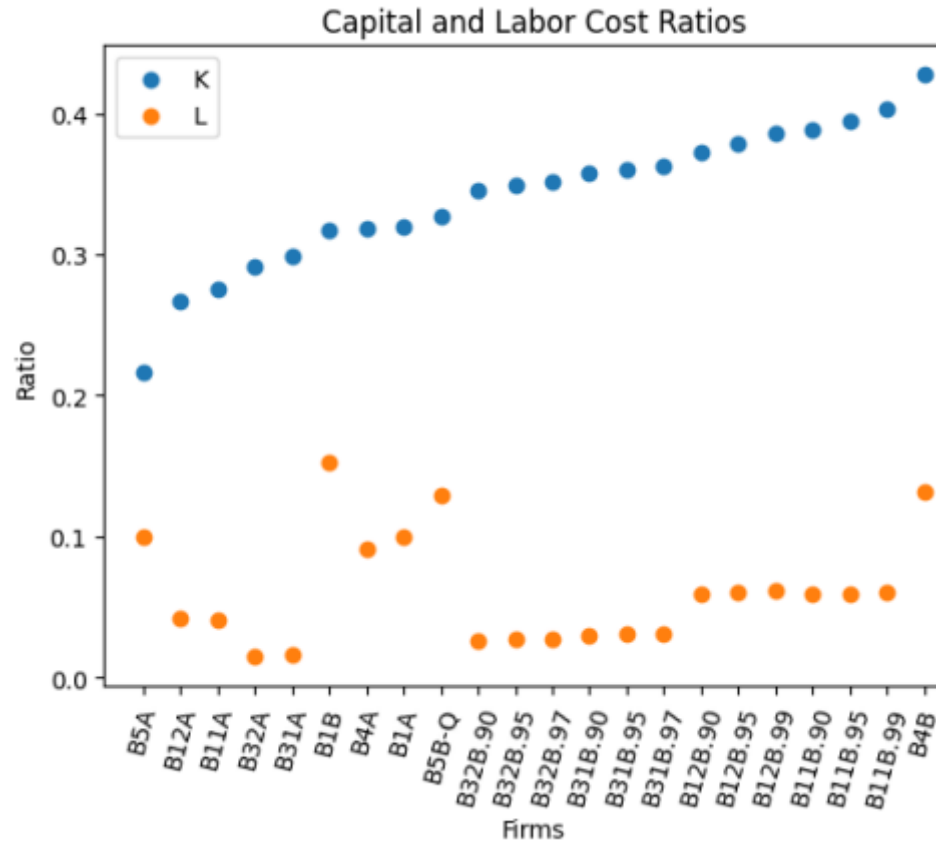


Approach

- Data from NETL's "Cost And Performance Baseline For Fossil Energy Plants Volume 1 Bituminous Coal and Natural Gas to Electricity" Report
 - Python script to search .pdfs for keywords, and conversion of tables to excel
- Calculate Firm Operating Costs
 - Python script to calculate shift level essential labor costs, administrative labor costs, other variable costs fixed costs, and influence of 45Q and the Social Cost of Carbon (SCC)
- Generate Visuals
 - R script to generate clean tables and graphs to visualize the data



Firm Production and Costs

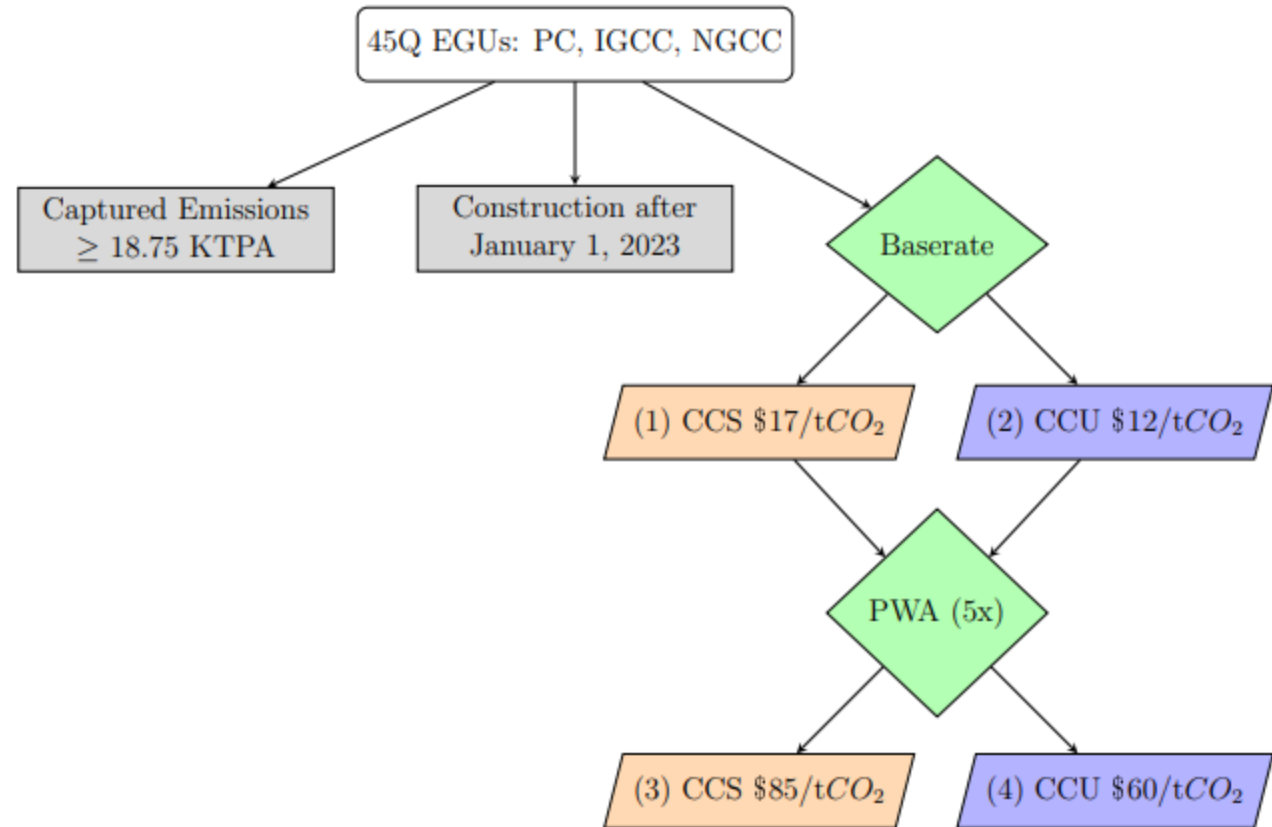




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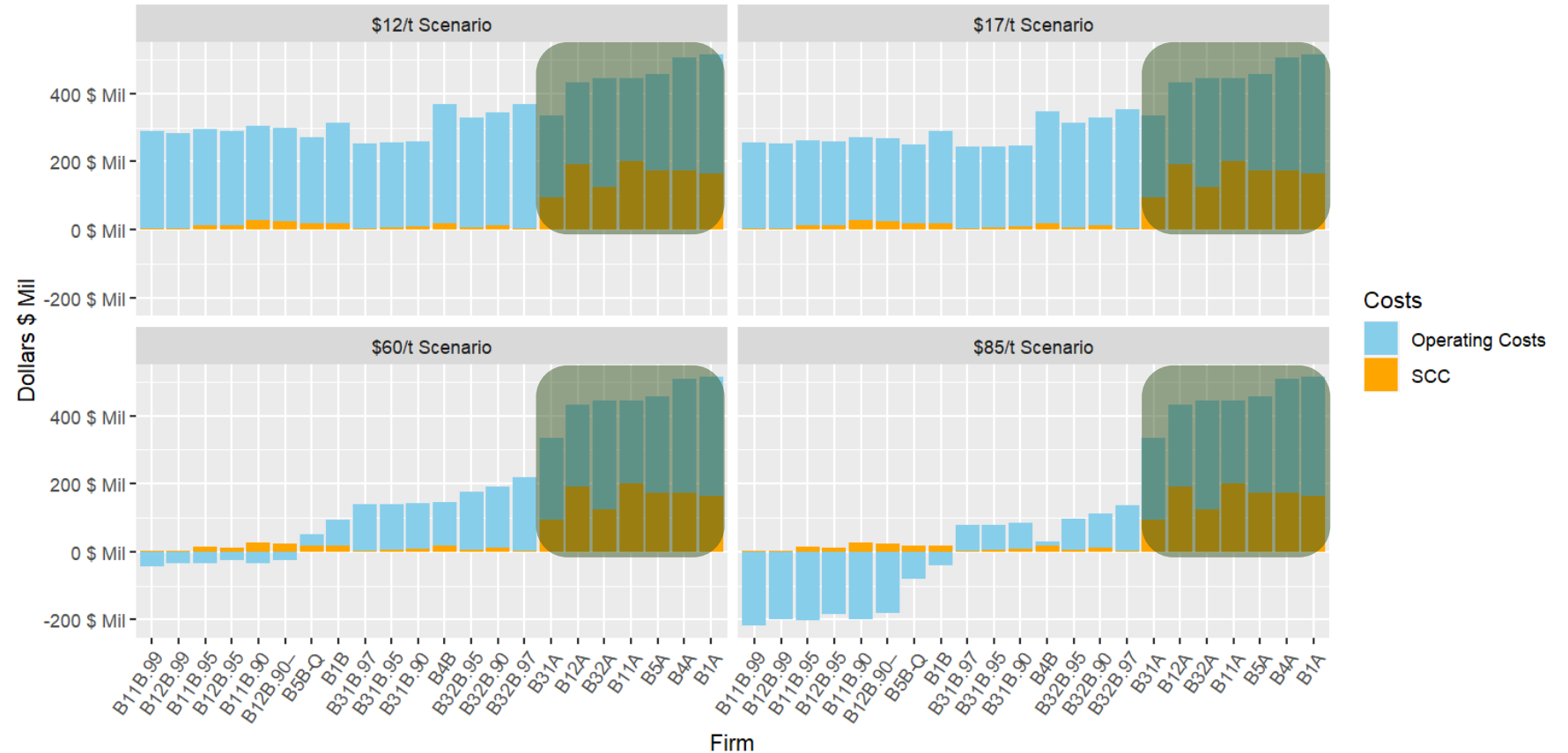
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Estimated Firm Costs

$$\text{Operating Costs} = FC + VC - (45Q_{1,5} * CO_{2,cap}) + (SCC * CO_{2,uncap})$$

Total Costs after 45Q Scenarios and SCC (\$51/t)

Full Name
B11A – SubC PC w/o CO2 Capture
B11B.90 – SubC PC w/ CO2 Capture
B11B.95 – SubC PC w/ CO2 Capture
B11B.99 – SubC PC w/ CO2 Capture
B12A – SC PC w/o CO2 Capture
B12B.90 – SC PC w/ CO2 Capture
B12B.95 – SC PC w/ CO2 Capture
B12B.99 – SC PC w/ CO2 Capture
B1A – Shell IGCC w/o CO2 Capture
B1B – Shell IGCC w/ CO2 Capture
B31A – 2x1 CT NGCC w/o CO2 Capture
B31B.90 – 2x1 CT NGCC w/ CO2 Capture
B31B.95 – 2x1 CT NGCC w/ CO2 Capture
B31B.97 F-frame 2x1 CT NGCC w/ CO2 Capture
B32A H-frame 2x1 CT NGCC w/o CO2 Capture
B32B.90 – 2x1 CT NGCC w/ CO2 Capture
B32B.95 – 2x1 CT NGCC w/ CO2 Capture
B32B.97 H-frame 2x1 CT NGCC w/ CO2 Capture
B4A – E-GasTM IGCC w/o CO2 Capture
B4B – E-GasTM IGCC w/ CO2 Capture
B5A – GEP Radiant IGCC w/o CO2 Capture
B5B-Q – GEP Quench IGCC w/ CO2 Capture



Data: "Cost and Performance Baseline For Fossil Energy Plants Volume 1 Bituminous Coal and Natural Gas To Electricity"



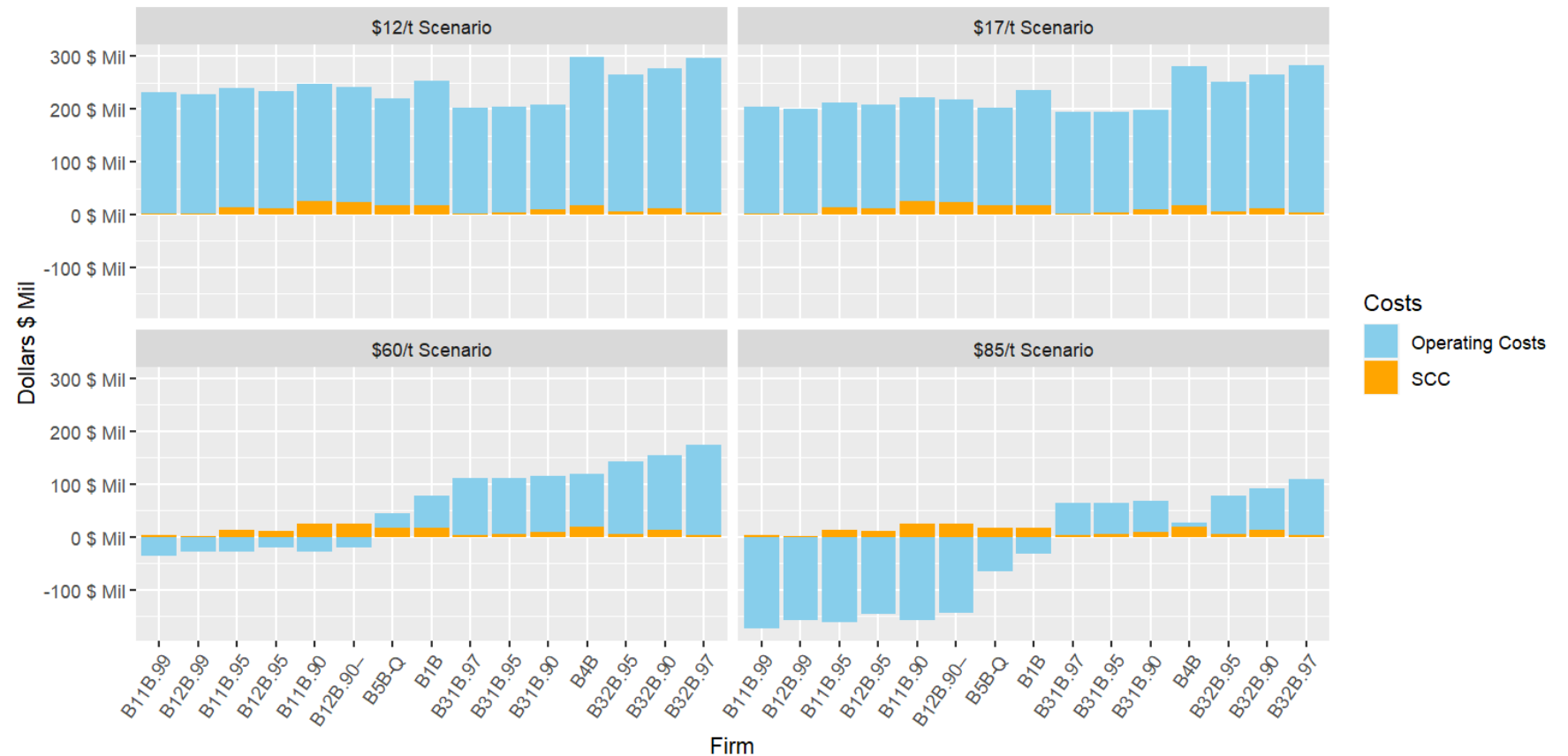
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Estimated CC Firm Costs

$$\text{Operating Costs} = FC + VC - (45Q_{1,5} * CO_{2,cap}) + (SCC * CO_{2,uncap})$$

Total Costs after 45Q Scenarios and SCC (\$51/t)

Full Name
B11B.90 – SubC PC w/ CO2 Capture
B11B.95 – SubC PC w/ CO2 Capture
B11B.99 – SubC PC w/ CO2 Capture
B12B.90– SC PC w/ CO2 Capture
B12B.95 – SC PC w/ CO2 Capture
B12B.99 – SC PC w/ CO2 Capture
B1B – Shell IGCC w/ CO2 Capture
B31B.90 – 2x1 CT NGCC w/ CO2 Capture
B31B.95 – 2x1 CT NGCC w/ CO2 Capture
B31B.97 F–frame 2x1 CT NGCC w/ CO2 Capture
B32B.90 – 2x1 CT NGCC w/ CO2 Capture
B32B.95 – 2x1 CT NGCC w/ CO2 Capture
B32B.97 H–frame 2x1 CT NGCC w/ CO2 Capture
B4B – E-Gas™ IGCC w/ CO2 Capture
B5B-Q – GEP Quench IGCC w/ CO2 Capture



Data: "Cost and Performance Baseline For Fossil Energy Plants Volume 1 Bituminous Coal and Natural Gas To Electricity"



Take-Away Points

- 45Q tax credits, (particularly PWA scenarios) lessen operational (op.) costs.
 - Rewards carbon capture by lessening operational costs.
 - High rates of carbon capture returns higher amounts of 45Q credits; lessens SCC effects.
- Baserate scenarios lessen EGUs (BB Rev4a) op. costs but are not optimized.
 - PC EGUs (BB Rev4a) optimize op. cost *recouperation* in PWA multiplier scenarios.
 - IGCC & NGCC EGUs (BB Rev4a) optimize op. cost *reduction* in PWA multiplier scenarios.
- Automated framework to analyze PWA requirements impacting the economics of implementing CC.
- Future time series research is needed for the tax credit duration.



Thank you.
Questions?