**Cost of CCS for a Combined Cycle Natural Gas Plant Based on EIA 2020 Data**

**Cost for 418 MW Base Combined Cycle Natural Gas Plant Plant (NO CCS)**

Total Overnight Capital Cost = $977/kW for Texas

($917/kW)\*(1000 kW/MW)\*418 MW = $383 MM

Plant Operating Factor: Assume 60% for New USC Plant

Capital Charge = $2.74E6 per month = $32.9E6/yr (20 yr life, 6% interest rate)

Generation = (418 MWh/h)\*(365 days/yr)\*(24hr/day)\*0.6 = 2.20E6 MWh/yr

Capital Charge = $32.9/2.20 = $14.95/MWh

Fixed O&M Costs = ($14.17/kW-yr)\*(1000 kW/MW)\*(yr/(365\*24 hr\*0.6)) = $2.70/MWh

Variable O&M = $2.56/MWh

Fuel = (6431 BTU/kWh)\*(1000 kWh/MWh)\*(MMBTU/1E6BTU)\*($4.00/MMBTU) = $25.72/MWh

Total Cost = $14.95 capital +$2.70 Fixed + $2.56 variable + $25.72 fuel = $45.93/MWh

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**Cost for 377 MW Base Combined Cycle Natural Gas Plant Plant (90% CCS)**

Total Overnight Capital Cost = $2410/kW for Texas

($2410/kW)\*(1000 kW/MW)\*377 MW = $909 MM

Capacity Factor: Assume 60% for New USC Plant

Capital Charge = $6.51E6 per month = $78.1E6/yr (20 yr life, 6% interest rate)

Generation = (377 MWh/h)\*(365 days/yr)\*(24hr/day)\*0.6 = 1.98E6 MWh

Capital Charge = $78.1/1.98 = $39.44/MWh

Fixed O&M Costs = ($27.74/kW-yr)\*(1000 kW/MW)\*(yr/(365\*24 hr\*0.6)) = $5.28/MWh

Variable O&M = $5.87/MWh

Fuel = (7124 BTU/kWh)\*(1000 kWh/MWh)\*(MMBTU/1E6BTU)\*($4.00/MMBTU) = $28.50/MWh

Total Cost = $39.44 capital +$5.28 Fixed + $5.87 variable + $28.50 fuel = $79.09/MWh

Delta With 90% CCUS Vs. NO CCUS

With CCUS NO CCUS Delta

Capital $39.44 $14.95 $24.49

Fixed O&M $5.28 $2.70 $2.58

Variable O&M $5.87 $2.56 $3.31

Fuel $28.50 $25.72 $2.78

Sub Total $79.09 $45.93 $33.16/MWh

Per EIA FAQs: How much carbon dioxide is produced per kilowatthour of U.S. electricity generation?

Use 0.455 tons CO2/MWh for Combined Cycle Single Shaft from EIA

Delta = ($33.16/MWh)/(0.455 tons CO2/MWh) = $72.88 /ton CO2

Add in for transportation + storage in Saline Formation in TX = $19.1/ton CO2

Total Cost for CCUS = $72.88 + $19.1 = $91.98/ton CO2 = $101.39/metric tonne CO2