



The Inflation Reduction Act's Impact on CCUS Project Development

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US Congress recently passed legislation supporting climate priorities & the energy transition

Infrastructure Investment and Jobs Act (IIJA)

Signed into law Fall 2021



The New York Times

Biden Signs Infrastructure Bill, Promoting Benefits for Americans



THE WALL STREET JOURNAL

How the \$1 Trillion Infrastructure Bill Aims to Affect Americans' Lives



Bloomberg

Biden Signs Bipartisan Infrastructure Bill, Vowing Change 'For the Better'



npr

Infrastructure Bill Provides Money for Bridges, Broadband, and more

Inflation Reduction Act (IRA)

Signed into law Summer 2022



The New York Times

The Inflation Reduction Act Is a Huge Deal for the Climate



THE WALL STREET JOURNAL

Inflation Reduction Act Could Supercharge Grid Energy Storage



Bloomberg

Senate passes Democrats' Landmark Tax, Climate, Drugs Bill

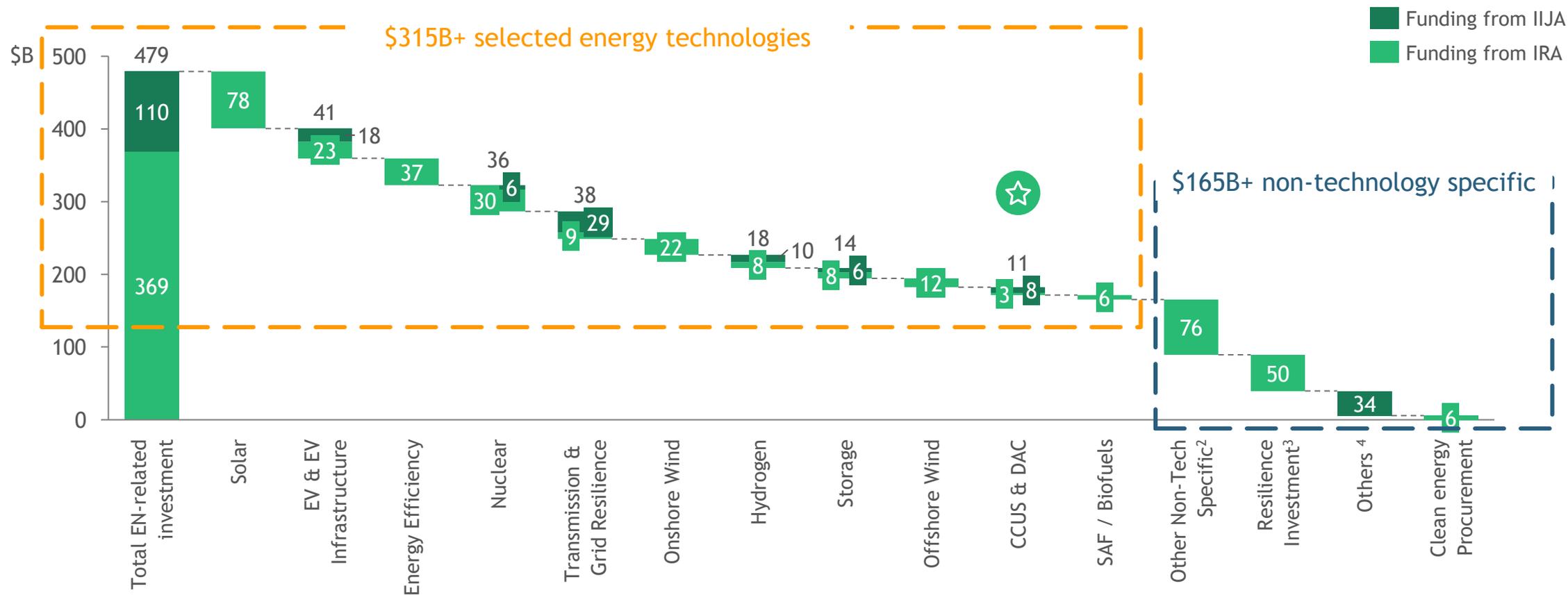


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What the Inflation Reduction Act incentives mean for your wallet



IIJA and IRA allocates \$479B+ in funding to broad range of energy related initiatives, \$315B+ of which for selected energy technologies



Federal funding expected to drive up to ~\$1.3T¹ in total investment for energy technologies; firms will need to quickly understand market implications and take steps to capture value

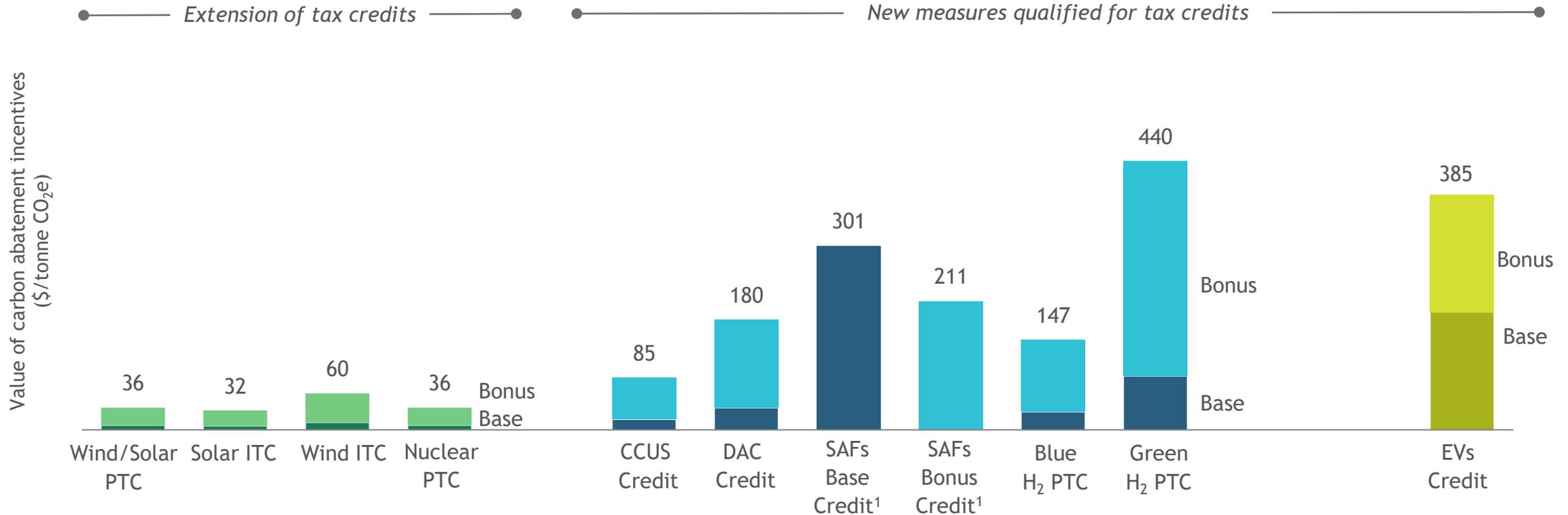
1. Technology-specific funding is expected to drive ~0.8T to ~1.2T in total investments, the addition of the remaining \$165B+ in broader federal funding brings the total investment up to ~1.3T. Source: CBO, BCG Analysis

CCUS & DAC with among the most attractive subsidy in the IRA on a levelized value of carbon basis

1 Renewables and nuclear incentives continue momentum in clean energy deployment

2 Higher incentives for emerging technologies indicate interest in rapid demonstration and deployment

3 EV incentive serves as industrial policy, increasing job creation and domestic manufacture of EVs



1. Note that SAFs credit is not split into base and bonus, due to the reduction in marginal richness of the bonus compared to the base incentive
 Source: H.R.5376 - Inflation Reduction Act from congress.gov

Summary of Incentives for CCUS and DAC from IRA



Qualified facility requirements

- **Power generation facilities:** ≥18,750 tpa & 75% total carbon emissions
- **Other industrial facilities:** ≥12,500 tpa
- **DAC facilities:** ≥1,000 tpa



Incentive value

- **CCUS Base:** \$17/t for geological storage or \$12/t for utilization
- **CCUS Bonus¹:** \$85/t for geological storage or \$60/t for utilization
- **DAC Base:** \$36/t for geological storage or \$26/t for utilization
- **DAC Bonus¹:** \$180/t for geological storage or \$130/t for utilization



Direct pay & transferability

- Developers can receive 45Q as direct payment, like tax overpayment
 - 5 years for tax-paying entities | 12 years for tax-exempt entities²
- 45Q recipients can transfer (all or part) of the 45Q credits in exchange for cash payments over the project life
 - Cash payment for the 45Q credits will not be taxable



Timeline

- Extended incentive to facilities that begin construction before BOY 2033
- Facilities receive credits over a twelve-year period beginning on the date the facility was placed in service (inflation-adjusted beginning in 2027 to base of 2025)



Stacking & maximum value

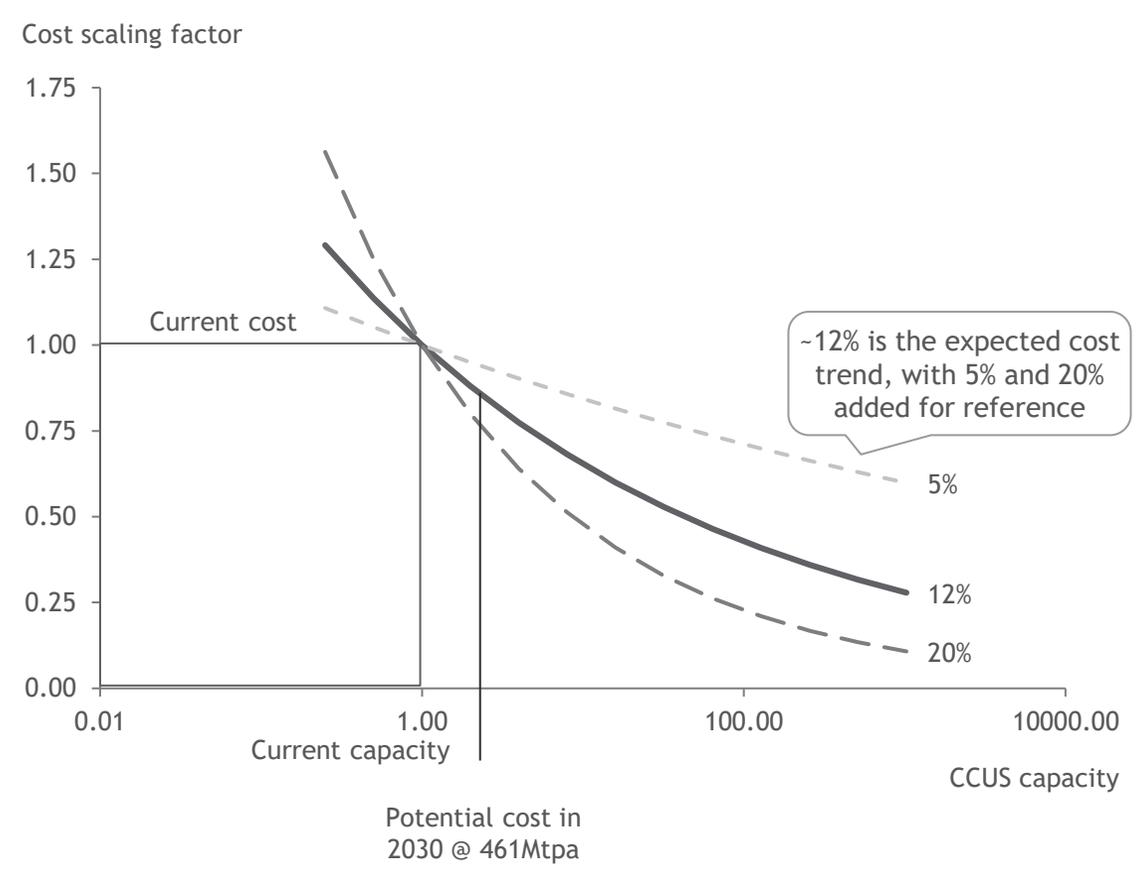
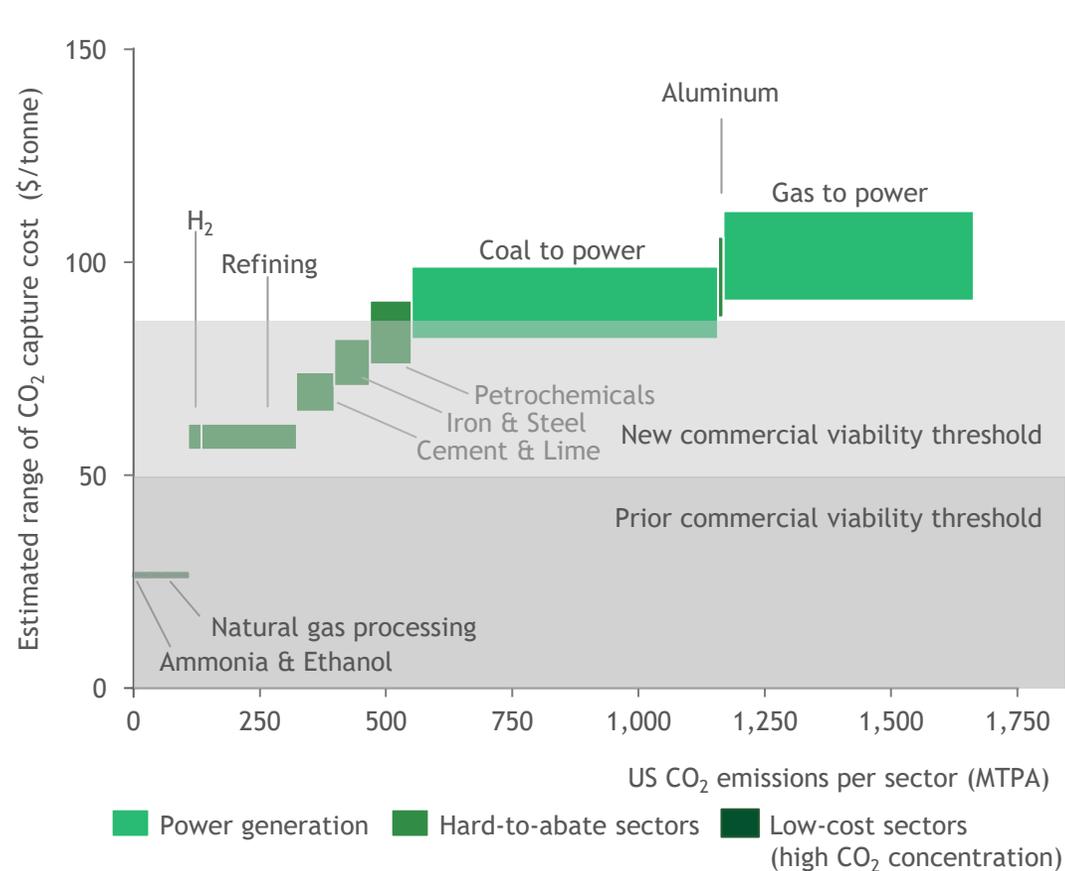
- Cannot be stacked with a clean hydrogen tax incentive

1. Bonus is a 5X Wage & Apprenticeship multiplier | 2. Examples include states, tribes, cooperatives, etc. | tpa = metric tons of CO₂ per year (ton per annum) | Source: Inflation Reduction Act, CATF

CCUS | Increased 45Q tax credits to \$85/t can make CCUS commercially viable for refining, hydrogen, cement, & steel sectors

\$85/ton incentives significantly expand CCUS commercial viability

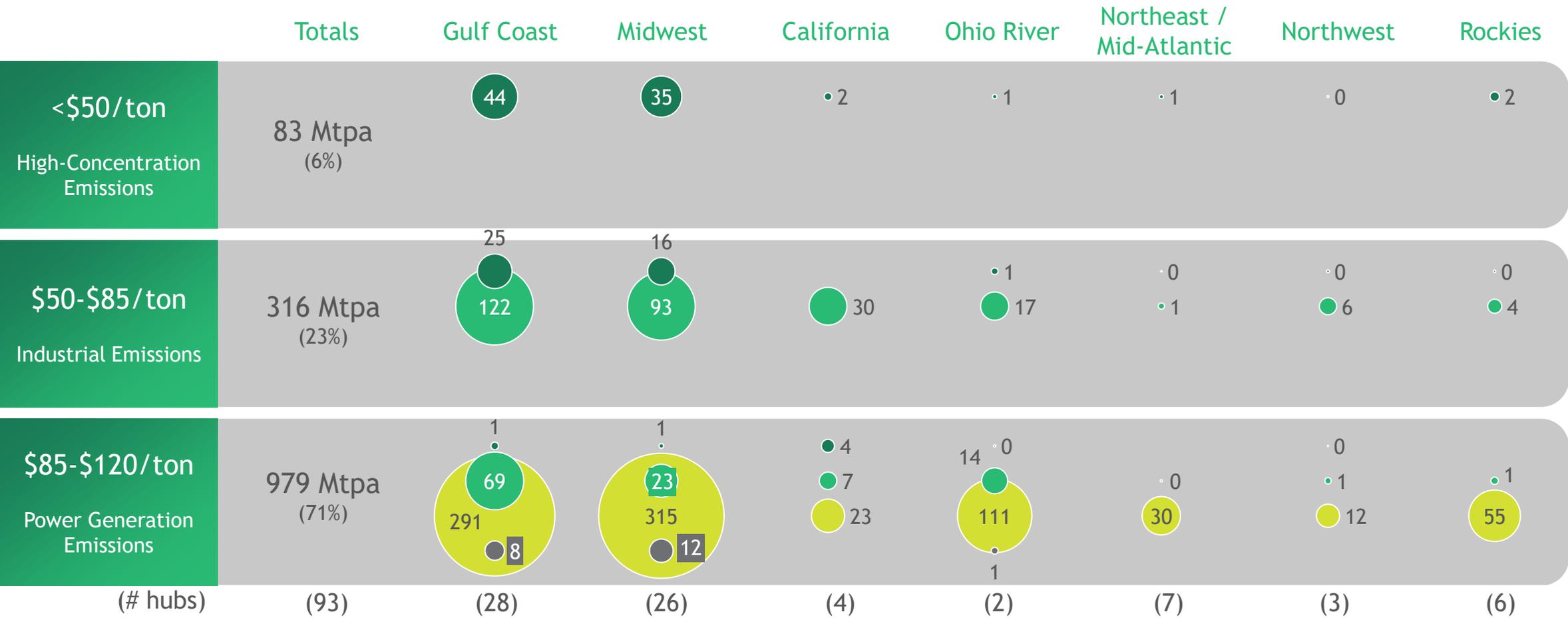
...and further cost reductions of ~12% are expected as deployment doubles, making coal+CCUS potentially viable



CCUS | More than 300Mt of emissions potentially "in the money" with \$85/t

Volume of emissions within sector by cost (Mtpa)¹²³

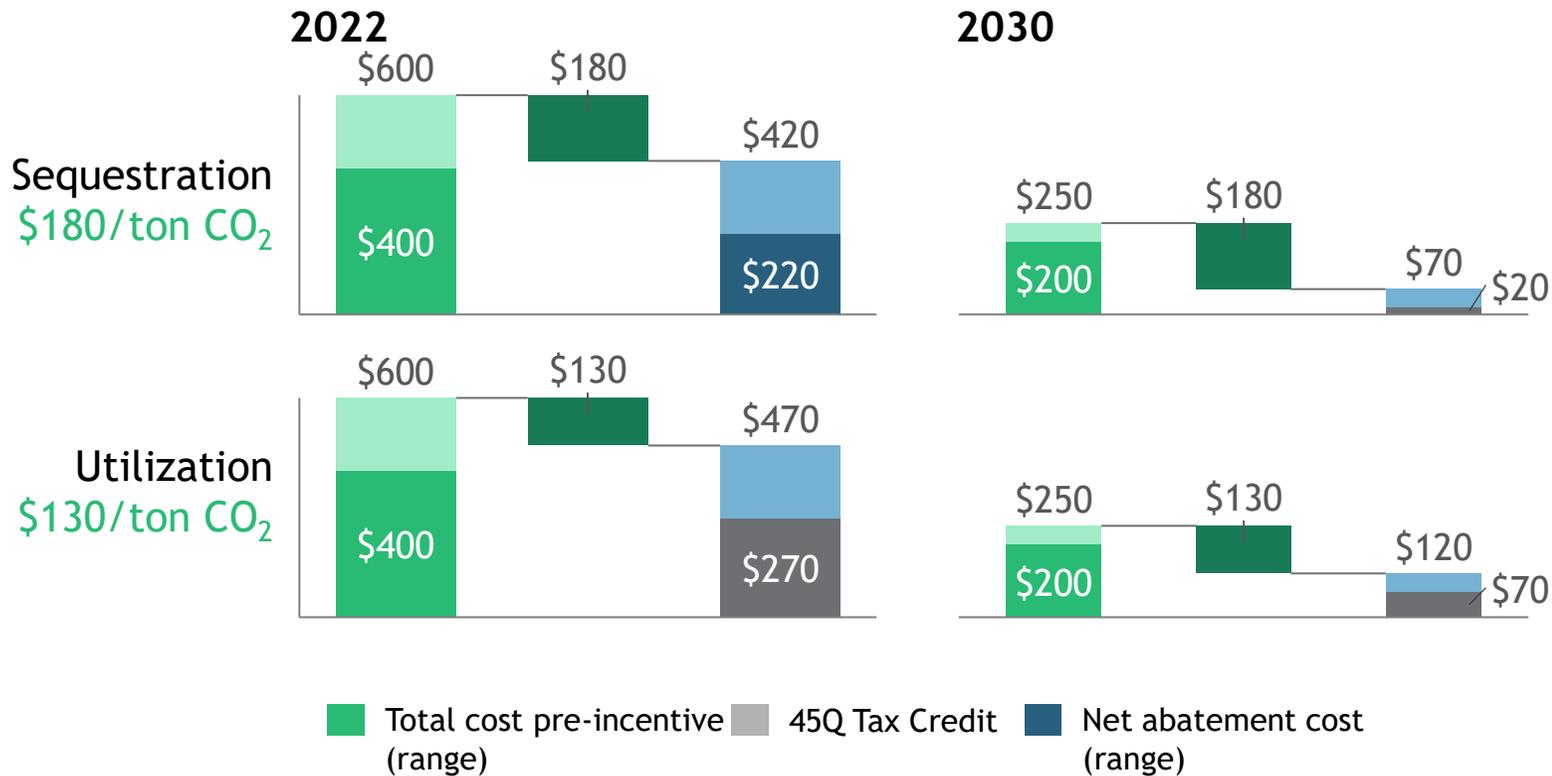
● High CO₂ Concentration ● Low CO₂ Concentration ● Power ● Other



1. High CO₂ sectors include: Ammonia, Chemicals (ferm.), Conv. Oil (incl. NGP), H₂, Petrochem.; Low CO₂ sectors include: Aluminum, Cement & Lime, Iron & Steel, and Petroleum Refining; Power sectors include: Fossil power Generation; Others include: Waste management, Wood, Pulp and Paper and Other Manufacturing | 2. Abatement costs based on emitters assigned to hubs within BCG CCUS tool, covering selected regions, using hub T&S costs, per emitter data directional | 3. Excludes ~690 Mtpa from isolated emitters which are not connected to hubs and ~120 Mtpa over \$120/ton; Source: EPA flight database 2019; BCG CCUS tool

DAC | Stacking the 45Q tax credit with LCFS can potentially enable a negative abatement cost for DAC

Projected cost of DAC (\$/ton) inclusive of new tax credits, 2022 vs. 2030



CA Low Carbon Fuel Standard (LCFS)

- A market-based program that focuses specifically on reducing carbon intensity (CI) of fuels used in California
- Provides credit-generation opportunities for the production and use of low-carbon fuels

Project-Based Crediting:

- Credits provided if lifecycle emissions have been reduced through **CCS or DAC** projects
- Must comply with state protocols, including monitoring of CO₂ storage for up to 100 years

Outcome:

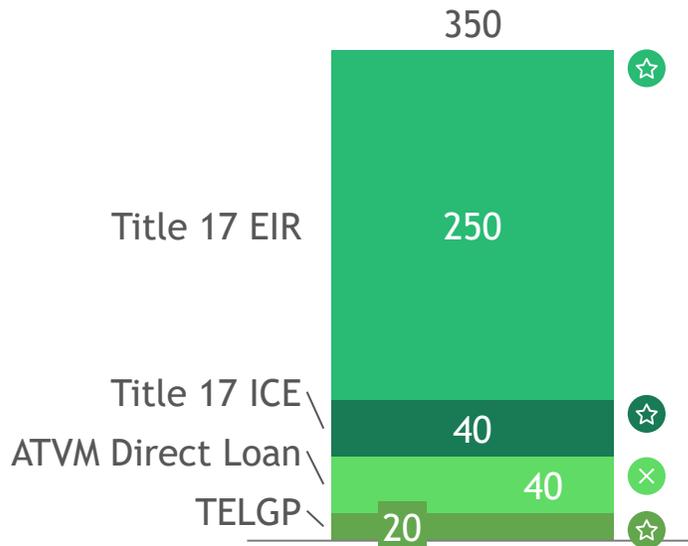
- CO₂ reductions via DAC (globally) can be exchanged for LCFS credits in California
- Credit holders can sell their LCFS credit to deficit parties under the market based LCFS Credit Banking & Transfer System

July 2022 Avg LCFS Credit Price¹: \$117

1. CARB's Monthly LCFS Transfer Activity Report - July 2022 | Source: CARB, Stillwater Associates, BCG Research

DOE Loan Programs Office | 2022 IRA resulted in ~\$350 B increase in estimated loan authority

Billions (USD) in DOE-LPO Loan Authority Under IRA



☆ Indicates CCUS applicability

Energy Infrastructure Reinvestment (EIR) Program (Section 1706)

- New program created under the IRA (\$5 B appropriated, total cap: \$250 B)
- Potential CCUS projects:
 - Repurposing shuttered fossil energy facilities for clean energy production
 - Updating operating energy infrastructure with emissions control technologies

Innovative Clean Energy (ICE) Program (Section 1703)

- For projects in the US with reasonable prospect of repayment
- Must qualify as innovation and not commercial¹
- Includes traditional CCUS projects, as well as:
 - agricultural and forestry practices that store and sequester carbon
 - synthetic technologies to remove carbon from the air and oceans

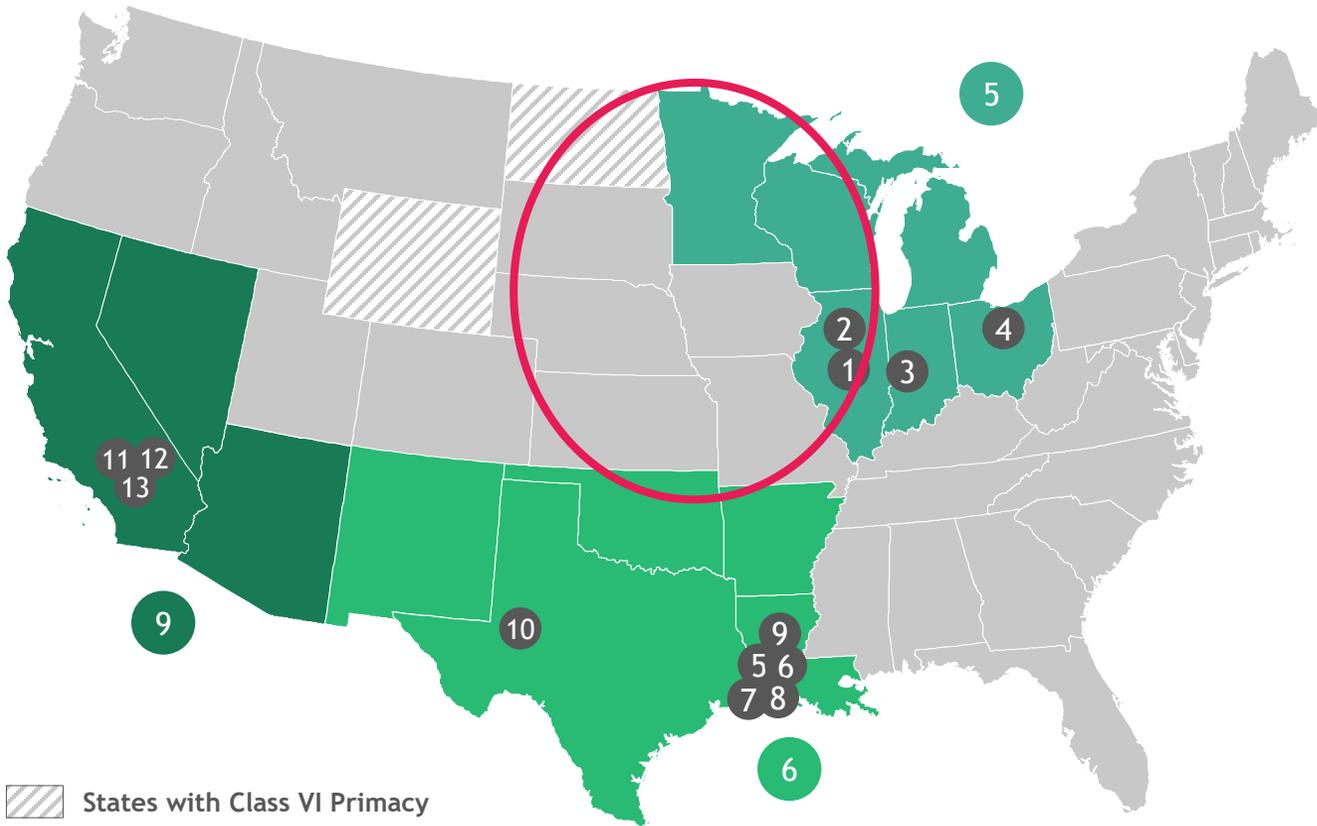
Advanced Technology Vehicle Manufacturing (ATVM) Direct Loan Program

- Available to advanced technology vehicles and their components

Tribal Energy Loan Guarantee Program (TELG)

- Provides partial guarantees of commercial or other qualified loans made for energy development to a federally-recognized Indian tribe, Alaska Native Corporation, or tribal energy development organization

Pending EPA Class VI Well Permits



5 EPA Region 5

1. IL - Archer Daniel Midland
- Includes both pre-permit & permitted
2. IL - Marquis Carbon Injection
3. IN - Wabash Carbon Services
4. OH - Lorain Carbon Zero Solutions

6 EPA Region 6

5. LA - Oxy LCV
6. LA - Gulf Coast Sequestration
7. LA - Gulf Coast Sequestration
8. LA - Hackberry Carbon Sequestration
9. LA - Capture Point Solutions
10. TX - Oxy LCV

9 EPA Region 9

11. CA - Carbon TerraVault
12. CA - Carbon TerraVault
13. CA - San Joaquin Renewables

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