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U.S. Carbon Management Status and Recent Awards

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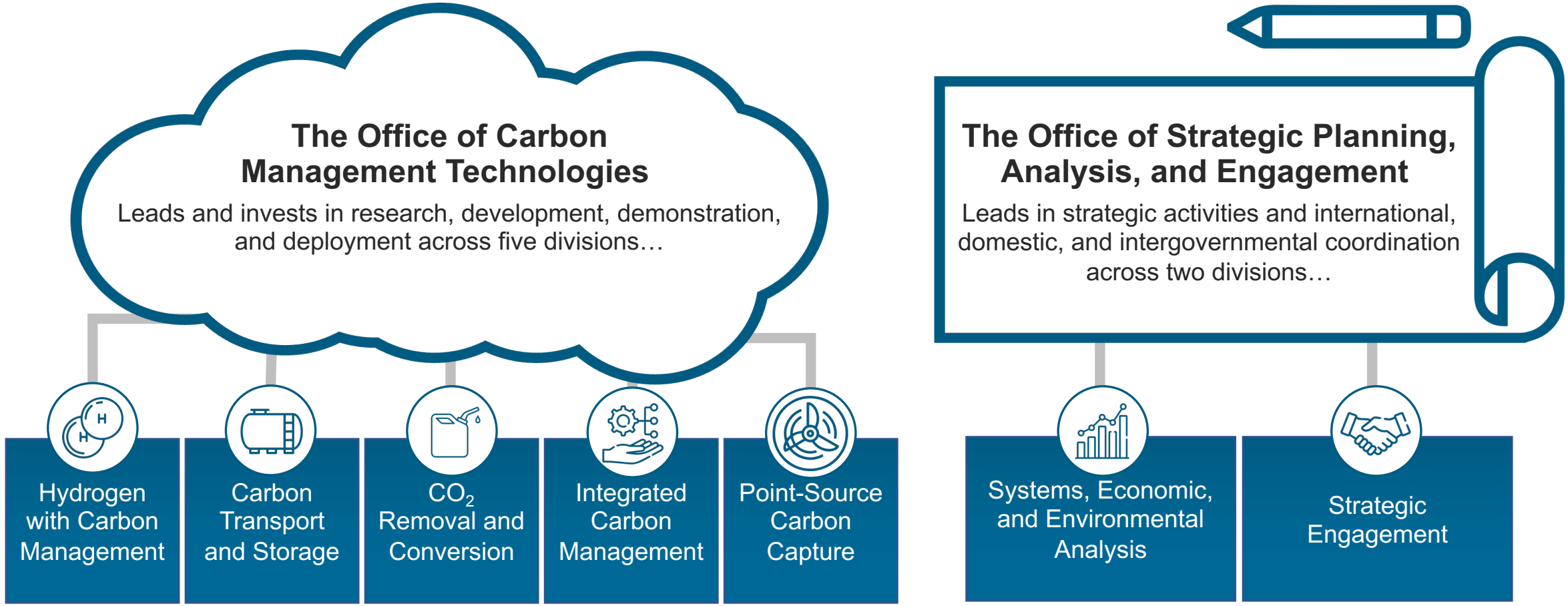
U.S. DEPARTMENT OF ENERGY
Fossil Energy and Carbon Management

FECM's Office of Carbon Management

Focused on minimizing the environmental and climate impacts of fossil fuels and industrial processes, while working to achieve net-zero GHG across our economy



Overview: Context of CCUS in the US to date

- **13 commercial-scale operating carbon capture projects** in the US with over 20 million metric tons per year (MMT/yr) of capture and storage, mostly:
  - High CO2-concentration industrial sources
  - For use in enhanced oil recovery (EOR)—over 1 billion tons to date
- **Nearly 200 projects under development** in response to enhanced 45Q tax credit
- **20+ years of DOE and industry investments validating CO_2 storage** capacity, injectivity, and containment at large commercial scale
- **Over 5,000 miles of CO_2 pipelines** currently transport over 50 MMT/yr (250 MMT/yr at full capacity)
- **Regulatory framework established** for CO_2 storage through EOR (Class II) and for dedicated geologic storage (Class VI); CO_2 pipeline regulations in place with update currently underway

Overview: Major U.S. federal investments

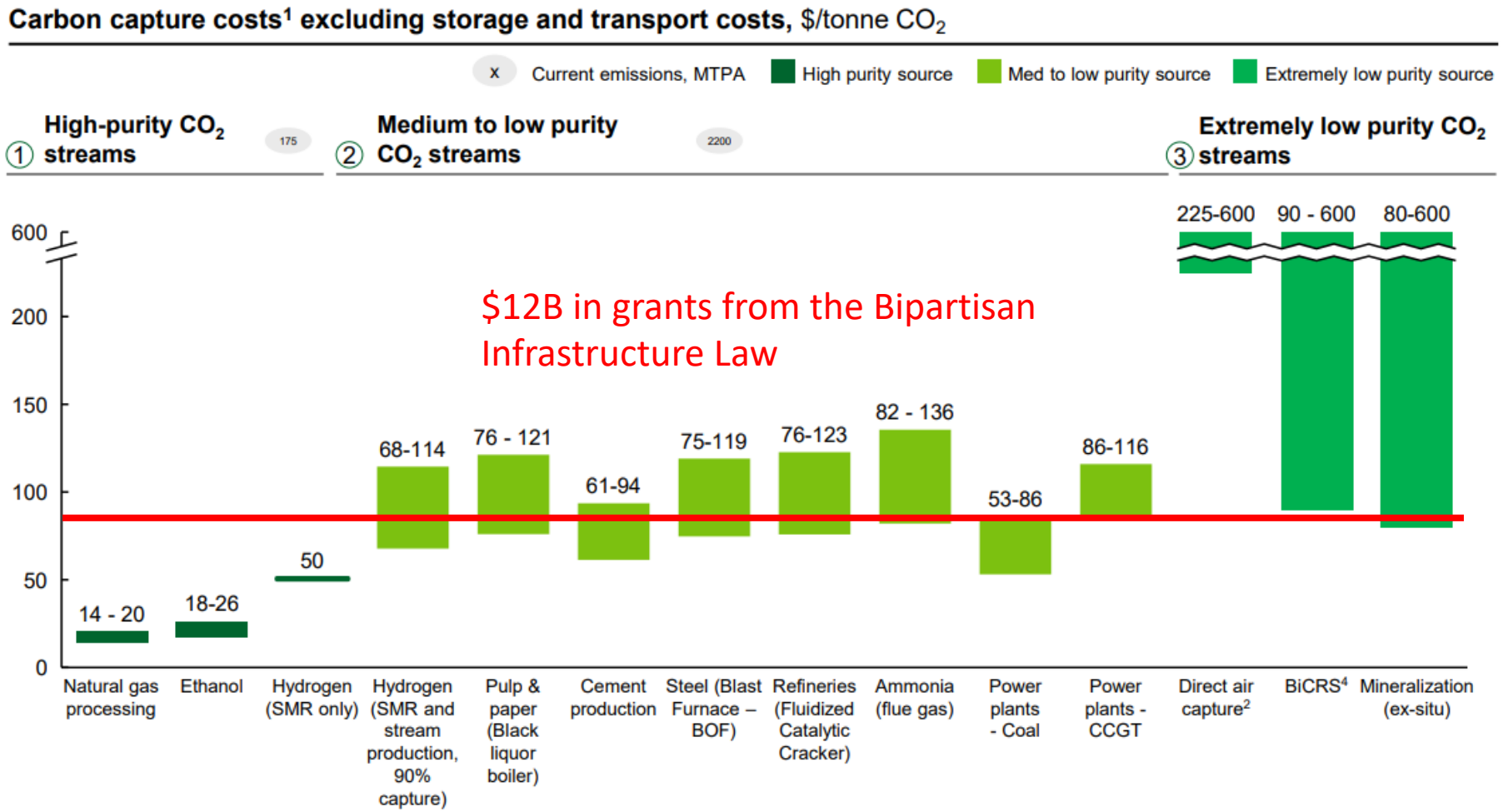
Bipartisan Infrastructure Law:

- **$12 billion for carbon management**:
  - Integrated CCUS projects (9 FEED studies and at least 6 commercial scale demonstrations);
  - Up to 10 large-scale CO2 capture pilots;
  - 4 regional direct air capture hubs of at least Mt/y scale
  - Funding for storage infrastructure to support 20-40 regional hubs;
  - Financing for regional CO2 transport infrastructure
- **$7 billion for 7 regional clean hydrogen hubs**, 4 of which involve hydrogen production from natural gas with carbon capture and storage

Inflation Reduction Act: Enhancements to 45Q CO2 capture and storage tax credit

- Industry and electric power: $85/ton for dedicated geologic storage and $60/ton for EOR storage and for utilization;
- Direct air capture: $180/ton for dedicated storage and $130/ton for EOR storage and for utilization
- Available for any project that begins construction by the end of 2032

Some capture applications already low-cost

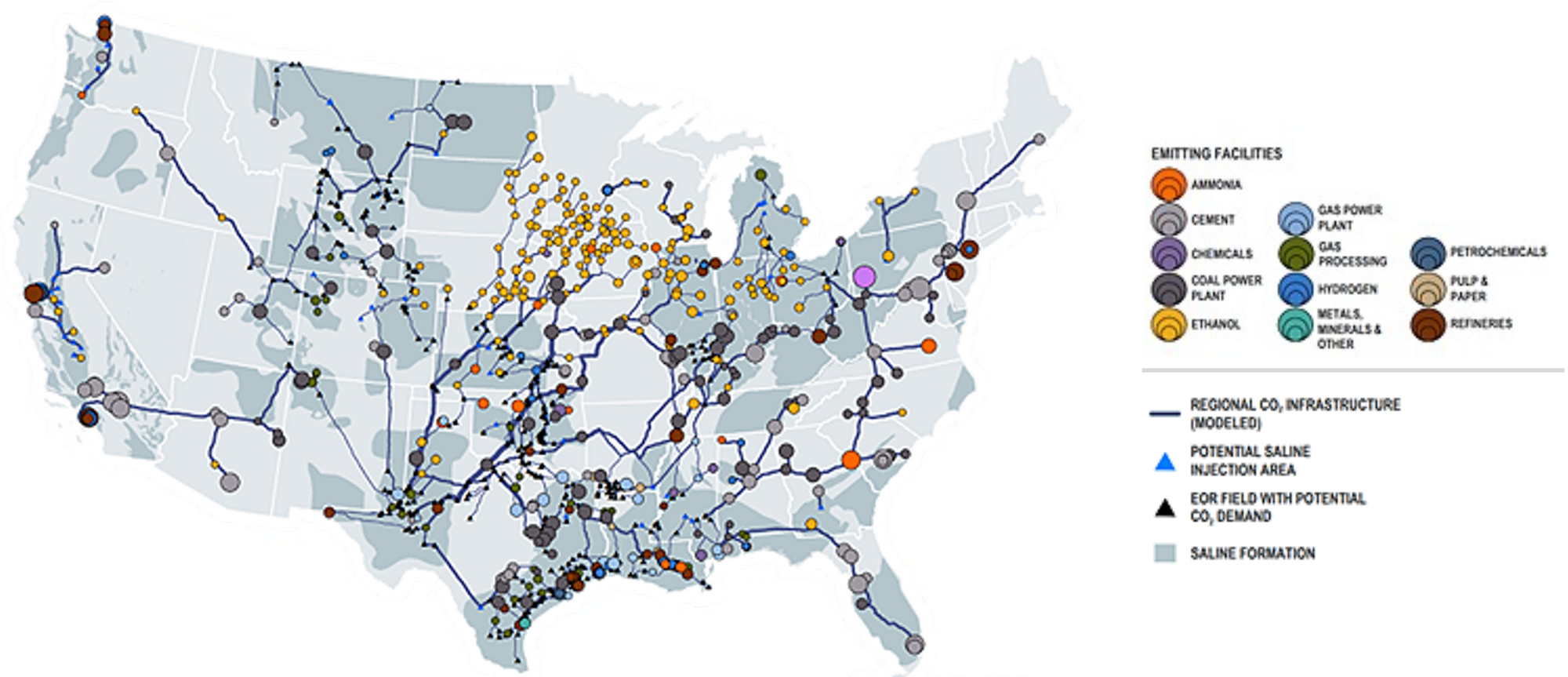


$12B in grants from the Bipartisan Infrastructure Law

45Q credit value = $85/t

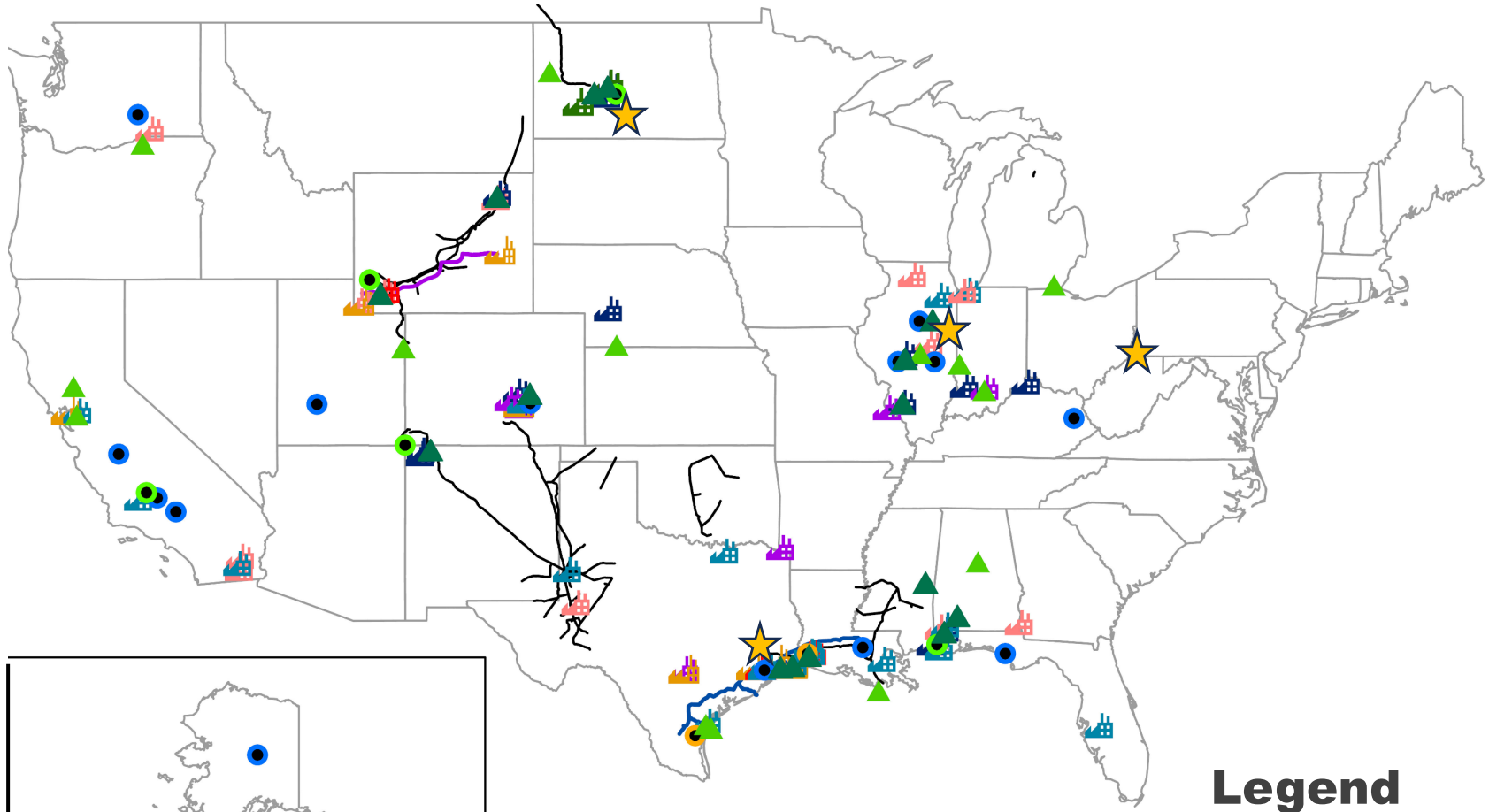
Additional support from state governments and voluntary corporate action

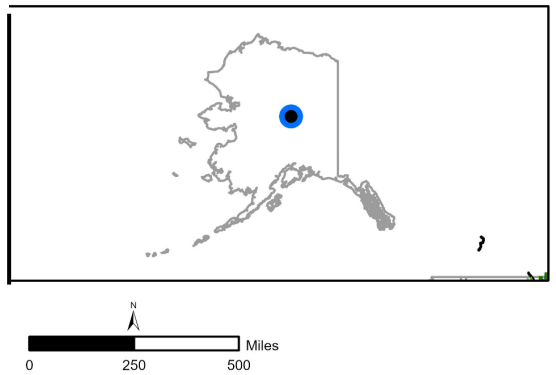
Modeled estimates of 300M+ tCO_2 capture by 2035



transport and storage network deployment modeling from the Great Plains Institute finds that, under 45Q, a shared, interconnected CO_2 transport and storage system could capture, transport and store 300 million metric tons of CO_2 per year by 2035 from industrial facilities and power plants.

DOE announced project funding under Bipartisan Infrastructure Law





Hydrogen Hub

CarbonSAFE
- Phase II
- Phase III

DAC Hub
- TA1
- TA2
- TA3

PreFEED/FEED Study
- Cement
- Chemicals
- Power-Coal

DAC
- Ethanol
- Power-Natural Gas
- Hydrogen

FEED Pipeline Selected
- Carbon Solutions – WyoTCH
- HEP – Gulf Coast Decarb System
- Existing CO_2 Pipeline

Legend

Social and environmental impacts essential for project success

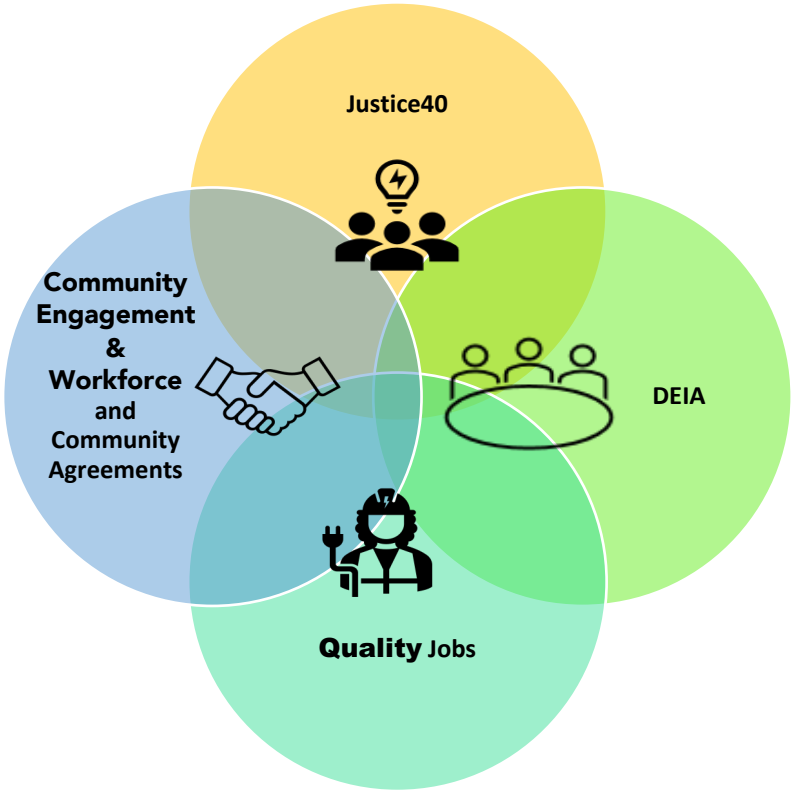
DOE includes community, workforce, and environmental criteria in funding opportunities (up to 20% on major demos)

DOE supports community and stakeholder engagement activities

DOE requires monitoring and data collection to inform life cycle analysis, including non-CO_2 emissions and water usage impacts

Community Benefits are Key to Project Success

Four-part Community Benefits Plans:



Justice40 Initiative (J40) directs 40% of the overall benefits of certain Federal investments to flow to disadvantaged communities:

1. **Decrease** energy costs and burdens.
2. **Decrease** environmental exposure and burdens.
3. **Increase** parity in clean energy technology.
4. **Increase** access to low-cost capital in DACs.
5. **Increase** clean energy enterprise creation and contracting.
6. **Increase** clean energy jobs, job pipeline and job training.
7. **Increase** energy resiliency.
8. **Increase** energy democracy, including community ownership.

TA-1 Selections:

- Community Benefits Plans not required as just assessing project feasibility; provides basis for detailed community engagement in future.

TA-2 Selections:

- Community Benefits Plans indicates intent to engage with community and labor stakeholders. Plans will be updated post award

TA- 3 Selections:

- Community engaged process beginning during negotiation and post award to refine and implement measurable Community Benefits.

U.S. DEPARTMENT OF ENERGY
Fossil Energy and Carbon Management

Thank You!

Questions?

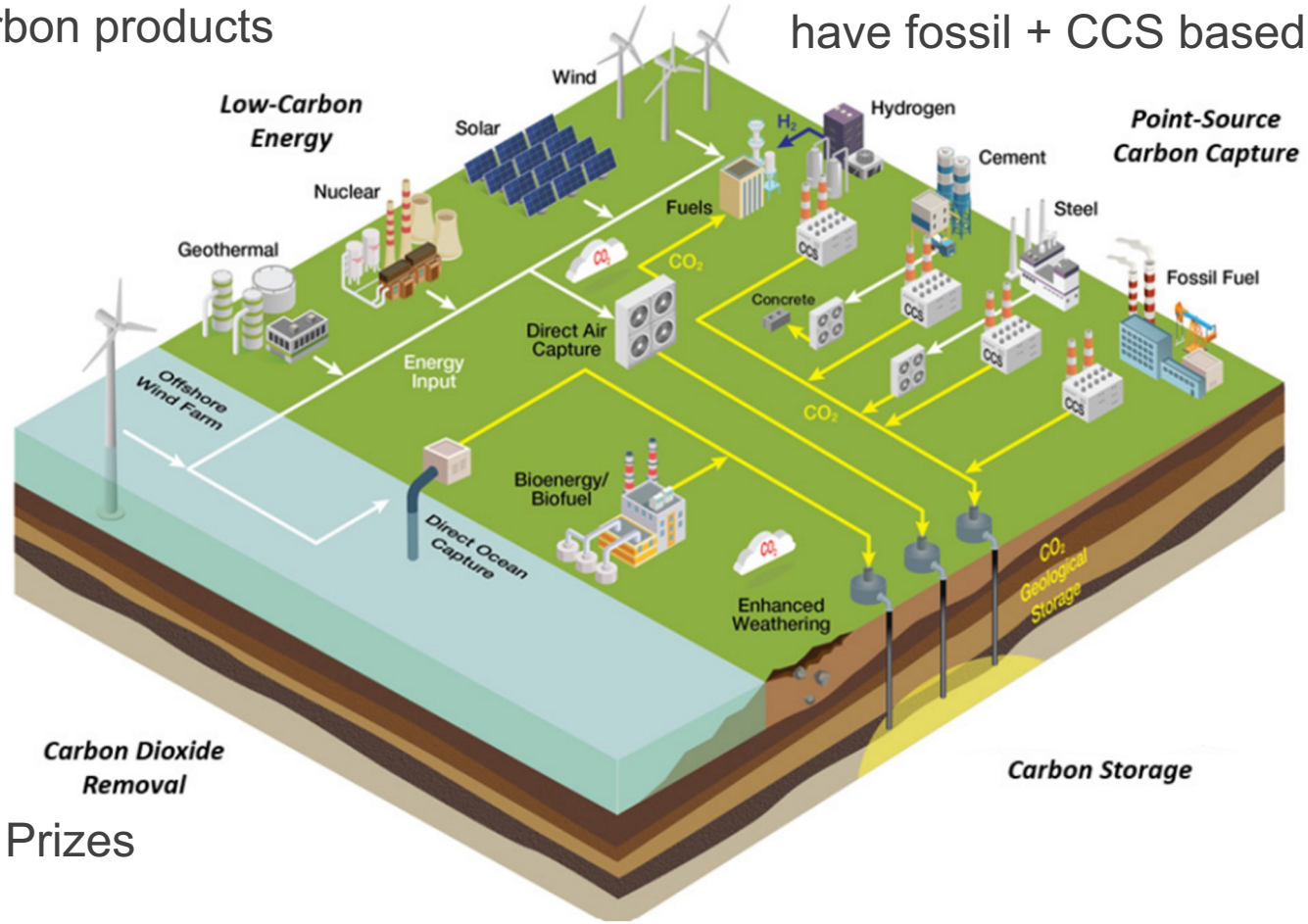
Contact Noah Deich, Deputy Assistant Secretary for Carbon Management: **Noah.Deich@hq.doe.gov**

Bipartisan Infrastructure Law funding

$300M for CO2 conversion grants for low embodied carbon products

$7B for H2 Hubs, of which at least one will have fossil + CCS based H2 production

$2.5B for CO2 transportation loan support via CIFIA program
$100M for CO2 transportation engineering studies

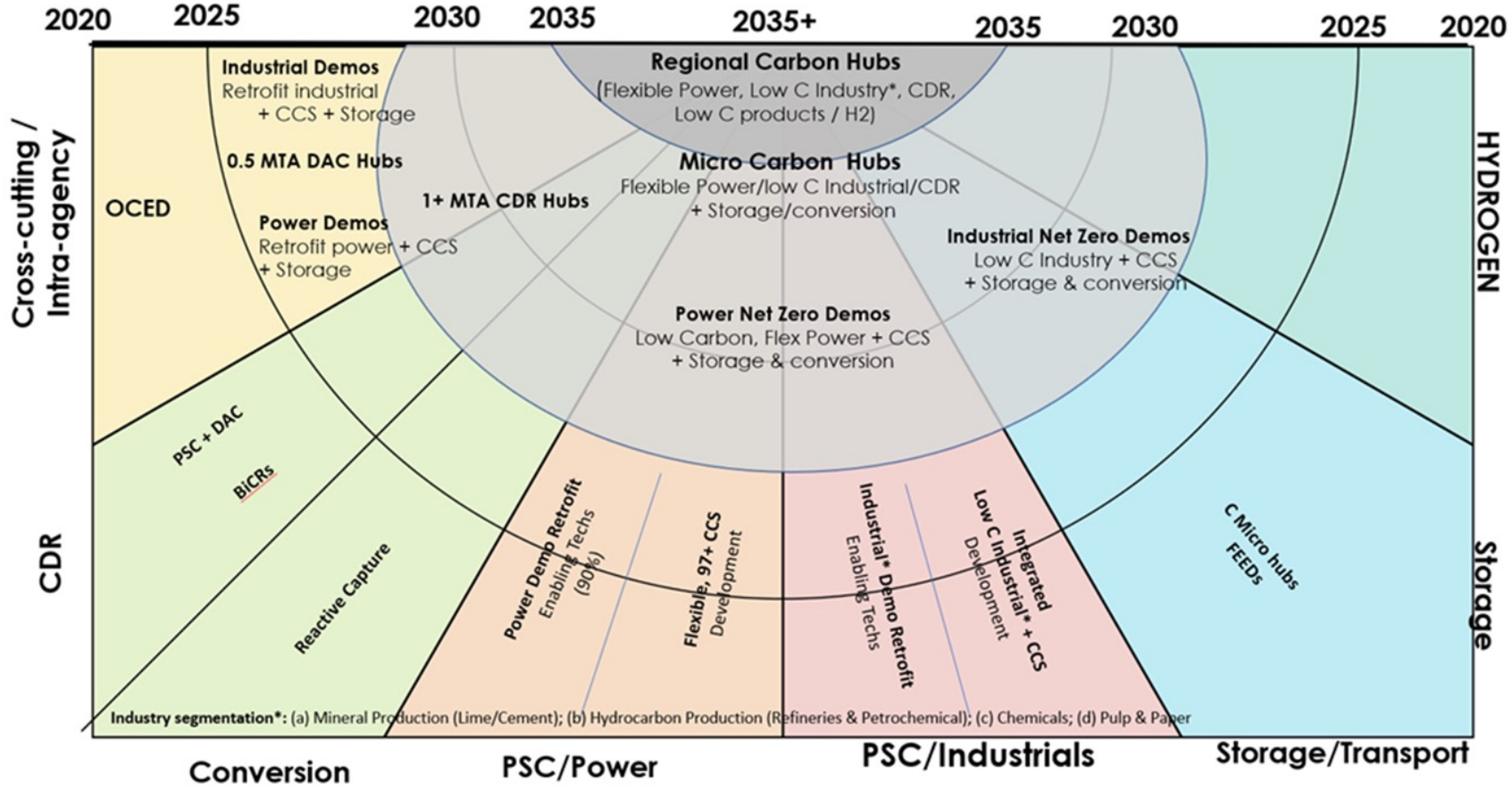


$2.5B for commercial CCS demonstrations
$1B for small CCS pilots

$3.5B for Direct Air Capture Hubs
$115M for Direct Air Capture Technology Prizes

$2.5B for expanding DOE's CarbonSAFE storage characterization and buildout initiative

Strategic Vision



Support **demonstration of first-of-a-kind carbon capture on power and industrial sectors** coupled to dedicated and reliable **carbon storage**, that will lead to commercially viable **carbon hub** opportunities for widescale deployment and facilitate a net zero economy by 2050, emphasizing robust analysis of **life cycle impacts**, and understanding **air/water quality impacts**.

100M+ t/y capacity by 2030 announced

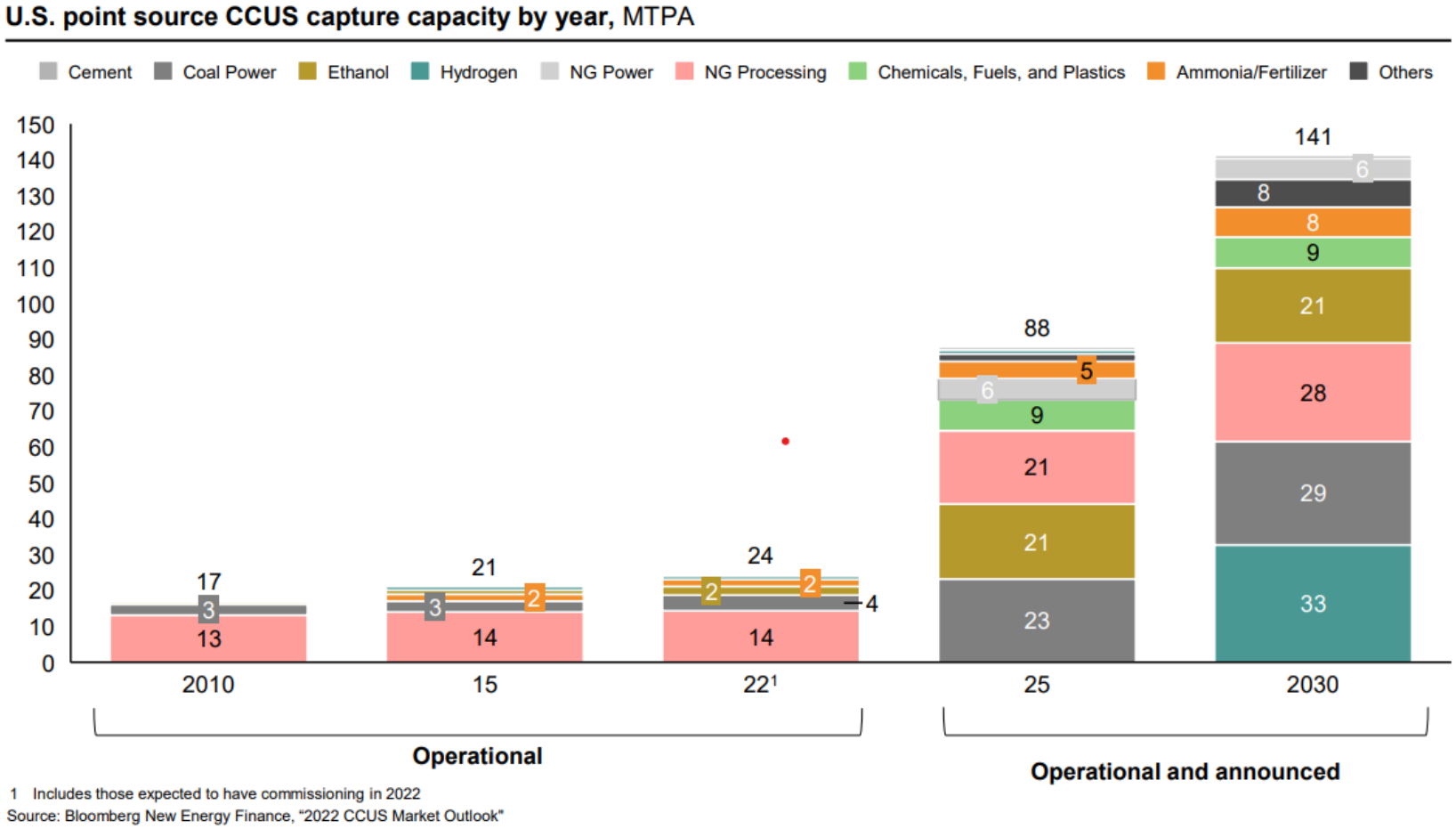


Figure 5: The U.S. has over 20 MTPA of operational point source CCUS capacity, with an announced project pipeline of ~140 MTPA as of Dec 2022