



U.S. DEPARTMENT OF
ENERGY

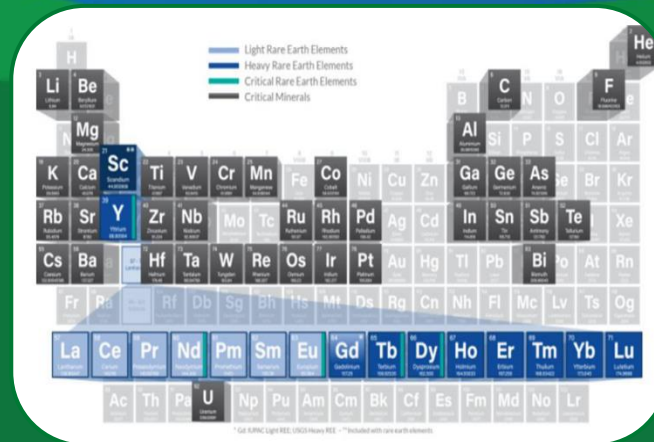
Fossil Energy and
Carbon Management

Fossil Energy and Carbon Management Hydrogen Program

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November 30, 2022



Fossil Energy and Carbon Management (FECM)

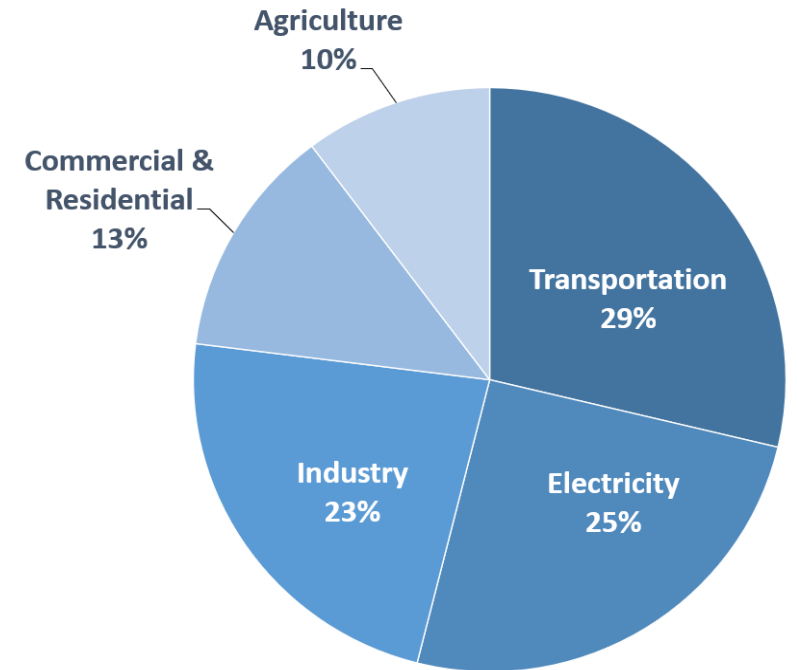
Office of Fossil Energy and Carbon Management

DOE-FE is now DOE-FECM

New name for our office reflects our new vision

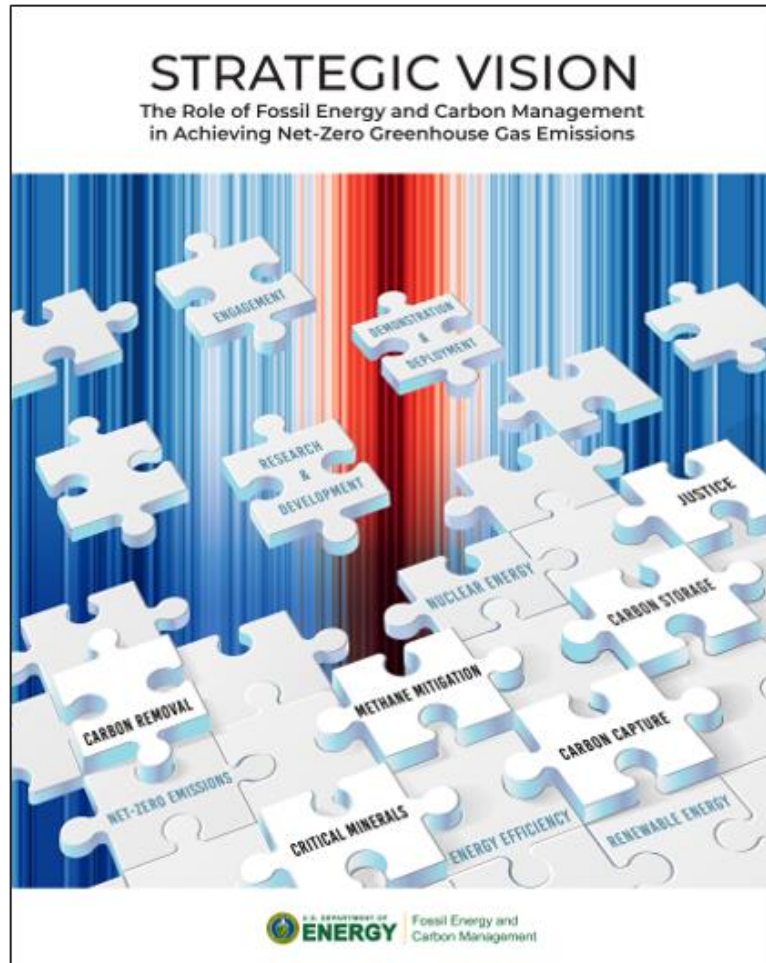
- President Biden's goals:
 - 50% emissions reduction by 2030
 - CO₂ emissions-free power sector by 2035
 - Net zero emissions economy by no later than 2050

Total U.S. Greenhouse Gas Emissions by Economic Sector in 2019



U.S. Environmental Protection Agency (2021). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019

A Vision for Carbon Management



A carbon management framework that will guide FECM's engagement with offices across the Department, Federal agencies, tribal and international governments, industry, non-governmental organizations, and communities

Advancing Justice, Labor, and Engagement

Priorities: Justice, labor, and international and domestic partnerships

Advancing Carbon Management Approaches Toward Deep Decarbonization

Priorities: Point-source carbon capture (PSC), carbon dioxide conversion, carbon dioxide removal (CDR), and reliable carbon transport and storage

Advancing Technologies that Lead to Sustainable Energy Resource

Priorities: Hydrogen with carbon management, domestic critical minerals (CM) production, and methane mitigation

Hydrogen Program Elements in FECM

- FECM's role is to focus on hydrogen production from fossil resources, waste such as plastics and MSW, and available biomass, along with CCUS, to achieve net-zero carbon hydrogen, as well as large scale power generation using turbines and large scale/geological H₂ storage.
- FECM also collaborates with EERE's Hydrogen and Fuel Cell Technologies Office and Bioenergy Technology Office.

Advanced Energy and Hydrogen Systems

- Program elements include Advanced Gasification, Advanced Turbines, and reversible Solid Oxide Fuel Cells, Sensors and Controls, Computational Science

Natural Gas Technologies

- The Natural Gas Technologies Program is comprised of 4 subprograms, including the newly-proposed Natural Gas Hydrogen Research subprogram.
- Focus areas for the new subprogram include advancing technologies for the carbon-neutral production, transportation, and storage of hydrogen sourced from natural gas.

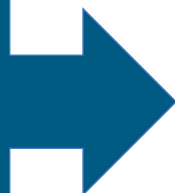
Current Gasification System Research

Modular Technology: Helping Gasification Access New Markets

Smaller, modular gasifier



- Faster development
- Lower capital investment
- Lower financial risk



**New
Markets**

Business Impacts:

- CapEx/OpEx reduction: through advanced manufacturing, plant-wide cost reduction opportunities
- Regional opportunities: enable local markets to quickly and cost-effectively utilize local feedstocks including legacy coal waste, waste plastic, MSW, and biomass wastes with CCS technology.

Hydrogen Energy Earthshot Initiative (HEEI)

Aligning our R&D efforts to target pathways to meet the HEEI goal

- NETL analyzed fossil-based hydrogen production pathway scenarios to guide program R&D
- Both NG and coal primary feedstocks were evaluated, in addition to biomass
- Holistic opportunities for reductions in LCOH and LCA GHG emissions were identified
- Significant cost reductions could come from unit siting choices, natural gas market conditions and by-product sales
- Identified further analyses needed for gasification routes



HEEI Goals:



1 Dollar



1 Kilogram



1 Decade

- \$1/kg H₂
- One decade (i.e., 2030)
- “1, 1, 1”

Inflation Reduction Act – 45Q Modifications

	Old	New
Commence Construction	January 1, 2026	January 1, 2033
DAC Facility	100,000 metric tons/year*	1,000 metric tons/year
Electric Generator	500,000 metric tons/year*	18,750 metric tons/year
All other facilities	100/000 metric tons/year*	12,500 metric tons/year
Saline Storage Credit	\$50/metric ton	\$85/metric ton (industry and power); \$180/metric ton (DAC)
EOR and Conversion Credit	\$35/metric ton	\$60/metric ton (industry and power); \$130/metric ton (DAC)

* Non-EOR Conversion facilities were previously 25,000 metric tons/year regardless of facility/source.

Notes: New Modifications allows up to 5 years for direct pay (up to 12 years certain entities)

Inflation Reduction Act – Clean H2 Production Tax Credit

Commence Construction	January 1, 2033
kg of CO2 per kg of H2	Credit Value (\$/kg)
<i>4 to 2.5</i>	<i>0.60</i>
<i>2.5 to 1.5</i>	<i>0.75</i>
<i>1.5 to 0.45</i>	<i>1.00</i>
<i>0.45 to 0</i>	<i>3.00</i>

Clean hydrogen: lifecycle greenhouse gas emissions rate of no greater than 4 kilograms of CO2 equivalent (“CO2e”) gas per kilogram of hydrogen. Section 45V of the Act creates a new tax credit for the production of qualified clean hydrogen (the “**Clean Hydrogen Production Credit**”).

As an alternative to the Clean Hydrogen Production Credit, taxpayers may elect the Section 48 Investment Tax Credit (the “ITC”) with respect to clean hydrogen production facilities, receiving an ITC of up to 30% depending on the carbon intensity of the production process.

The Clean Hydrogen Production Credit is not available, however, for clean hydrogen produced at a facility that also includes carbon capture equipment for which the Section 45Q carbon capture tax credit is allowed to any taxpayer.