

About the Carbon-Free Technology Initiative

The Carbon-Free Technology Initiative (CFTI) aims to achieve net-zero emissions in the U.S. electricity sector by promoting policies to ensure the commercial availability of affordable, carbon-free, 24/7 power technologies by the early 2030s. Participants in the CFTI include the Edison Electric Institute (EEI) and its member companies, Clean Air Task Force, Bipartisan Policy Center, Center for Climate and Energy Solutions, ClearPath, Great Plains Institute, Information Technology & Innovation Foundation, Nuclear Energy Institute, and Third Way.

The CFTI focuses on policy recommendations to advance key technology areas:

- Advanced wind and solar energy systems;
- Long-duration storage and advanced demand efficiency;
- Advanced, dispatchable, and renewable super hot rock deep geothermal;
- Zero-carbon fuels, such as hydrogen;
- Advanced nuclear energy (both fission and fusion); and
- Carbon capture, utilization, and storage.

While encompassing a broad range of recommendations, many of the proposals across all the technology areas can be grouped into four areas: research and development, demonstration, deployment, and commercial ecosystem issues that have an impact on the cost or performance of a technology, such as infrastructure siting and permitting.

Most federal support for clean energy R&D occurs through the Department of Energy (DOE). Regarding R&D for carbon-free technologies, proposed policy recommendations would, among other things:

- Significantly increase funding for energy innovation R&D programs at DOE over the next five years, including through ARPA-E and the national laboratories. Such funding should continue to increase after the initial five-year period.
- Create dedicated programs and initiatives at DOE focused on each of the technology areas to accelerate their development and establish new mechanisms for public- and private-sector collaboration, including with state and local entities.

Enabling projects to move quickly from R&D and pilot demonstrations toward commercial-scale demonstration is essential. Demonstration projects face several hurdles, including limited appetite by private investors and federal efforts that suffer from limited funding and limited risk appetite. To overcome these hurdles, proposed policy recommendations would:

- Establish a dedicated program to guide and support the demonstration of the priority technologies noted above.
- Establish consortia with collaboration and knowledge-sharing across federal agencies, the national labs, and non-governmental and other entities with informative expertise.

- Adopt several measures to reduce barriers to using loan guarantees offered by the DOE Loan Program Office.
- Establish alternative cost-share formulas for demonstration projects not necessarily tied to a 50/50 split (e.g., for early-stage project development, an 80/20 cost-share grant program would be appropriate).
- Increase appropriations to support commercial-scale demonstration projects involving first-of-a-kind and Nth-of-a-kind technologies.

A range of mechanisms is needed to support carbon-free technologies in moving from the demonstration stage to achieving technical maturation at a commercial scale and relative competitiveness in the marketplace. Proposed policy recommendations with respect to the deployment of carbon-free technologies would:

- Provide financial incentives for investing in deployment of these technologies, including production or investment tax credits (with monetization), loan guarantees, and grants.
- Extend and expand existing tax credits, such as 45Q for carbon sequestration.
- Develop a technology-inclusive tax credit to incentivize deployment of new carbon-free technologies.
- Authorize the federal government to offer a contract-for-differences mechanism that buffers the technology against downside market risk while sharing upside profits with taxpayers.
- Utilize federal government virtual power purchase agreements of 10-30 years for some carbon-free energy technologies.
- Establish enterprise zones for power plant sites that are closing to encourage deployment of new carbon-free energy technologies in those zones.
- Establish a federal clean energy fund that would invest in, as well as spur private investment in, carbon-free energy technologies.

Achieving net-zero carbon emissions from the electric power sector will require substantial infrastructure investments. This will require both the ability to permit and site (1) generating facilities and (2) the supporting infrastructure, such as transmission, natural gas pipelines, and storage sites, that enables their operation. Proposed policy recommendations to address these “ecosystem” issues would:

- Address siting barriers to construction of clean energy generation, transmission, and carbon dioxide (CO₂) pipelines.
- Reform siting and permitting on federal lands.
- Provide federal support mechanisms for licensing carbon-free energy technologies, such as advanced nuclear facilities by the Nuclear Regulatory Commission.
- Establish industry consortia for broader deployment and use of carbon-free energy technologies across industries.

Recommended Funding Levels for the Department of Energy’s Applied Energy Programs

The Carbon-Free Technology Initiative is providing specific recommendations for increasing funding for the applied energy programs at DOE, with a focus on advanced clean energy technologies that are a critical path for rapid power-sector decarbonization.

Within these programs, funding demonstration projects will be key to achieving decarbonization goals. Key new authorizations from the Energy Act of 2020—including for demonstration of technologies such as super hot rock geothermal, advanced nuclear fission, and zero-carbon fuels—should be, at a minimum, fully funded and should be increased, if possible, above authorization levels, through fiscal year 2025.

CFTI recommends a tripling of total spending at DOE for research, development, demonstration, and deployment in power-sector technologies in the next five years. These federal funds are necessary to provide the technology pathways to rapidly decarbonize the power sector. Additionally, CFTI recommends new programs and authorizations to increase demonstration and deployment over the next five years.

For this coming fiscal year, CFTI recommends a doubling of funds to be spent through authorized DOE programs on research, development, and demonstration of clean power-sector technologies.

The table below presents the following funding information. First, fiscal year 2022 authorized funding levels from the Energy Act of 2020 for relevant power-sector programs that are referenced in the CFTI's technology papers. Second, funding levels associated with recommendations from CFTI for fiscal year 2022, which is a combination of increases in funding levels to currently authorized programs and new CFTI-recommended policies and programs with associated funding levels that have not yet been enacted into law. The final column represents cumulative funding recommendations for fiscal years 2022 through 2025 across currently authorized programs and new CFTI-recommended policies and programs with associated funding levels that have not yet been enacted.

Here are some specific recommendations around funding for each carbon-free, power-sector technology at DOE:

Advanced Nuclear

Double existing research and development budgets for nuclear fission technologies to approximately \$1 billion in fiscal year 2022.

Carbon Capture, Utilization and Storage

Double funding for existing demonstrations and authorize new programs that will fund carbon capture infrastructure.

Super Hot Rock Geothermal

Provide support for at least two demonstrations for super hot rock geothermal, and double funding for geothermal technologies overall to provide a dedicated program and laboratory for super hot rock research and development.

Zero-Carbon Fuels

Double research and development dollars for zero-carbon fuels and authorize new programs for demonstration and deployment.

	FY22 (Authorized Funding Levels and Programs)	FY22 (Recommended Funding Levels for Current and New Program Authorizations)	FY22-25 (Cumulative Recommended Funding Levels for Current and New Program Authorizations)
Carbon Capture, Utilization and Storage	\$1,205,000,000	\$4,995,000,000 <i>(\$1,640,000,000)*</i>	\$19,880,000,000 <i>(\$6,560,000,000)*</i>
Advanced Nuclear	\$1,040,000,000	\$2,230,000,000 <i>(\$25,000,000)*</i>	\$9,145,000,000 <i>(~\$125,000,000)*</i>
Advanced Renewables (Wind, Solar)	\$425,000,000	\$425,000,000	\$1,700,000,000
Storage and Demand Efficiency	\$648,000,000	\$648,000,000	\$2,646,000,000
Zero Carbon Fuels	partial of \$830,000,000	\$3,430,000,000 <i>(\$2,500,000,000)*</i>	\$13,720,000,000 <i>(~\$12,500,000,000)*</i>
Super Hot Rock Geothermal	\$30,000,000	\$100,000,000 <i>(\$70,000,000)*</i>	\$400,000,000 <i>(~\$350,000,000)*</i>
Total	\$4,178,000,000	\$11,828,000,000 <i>(\$4,235,000,000)*</i>	\$47,491,000,000 <i>(~\$19,535,000,000)*</i>

**bracketed numbers represent funding levels that do not have corresponding authorizations*