January Update: 45V Guidance Analysis

EVs & Renewable Power Lead DOE Loan Guarantee Awards

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45V – Final Updates To IRA’s Hydrogen Program

W|Carbon: 45V Final Rules Published For Clean H_2 Production Tax Credit

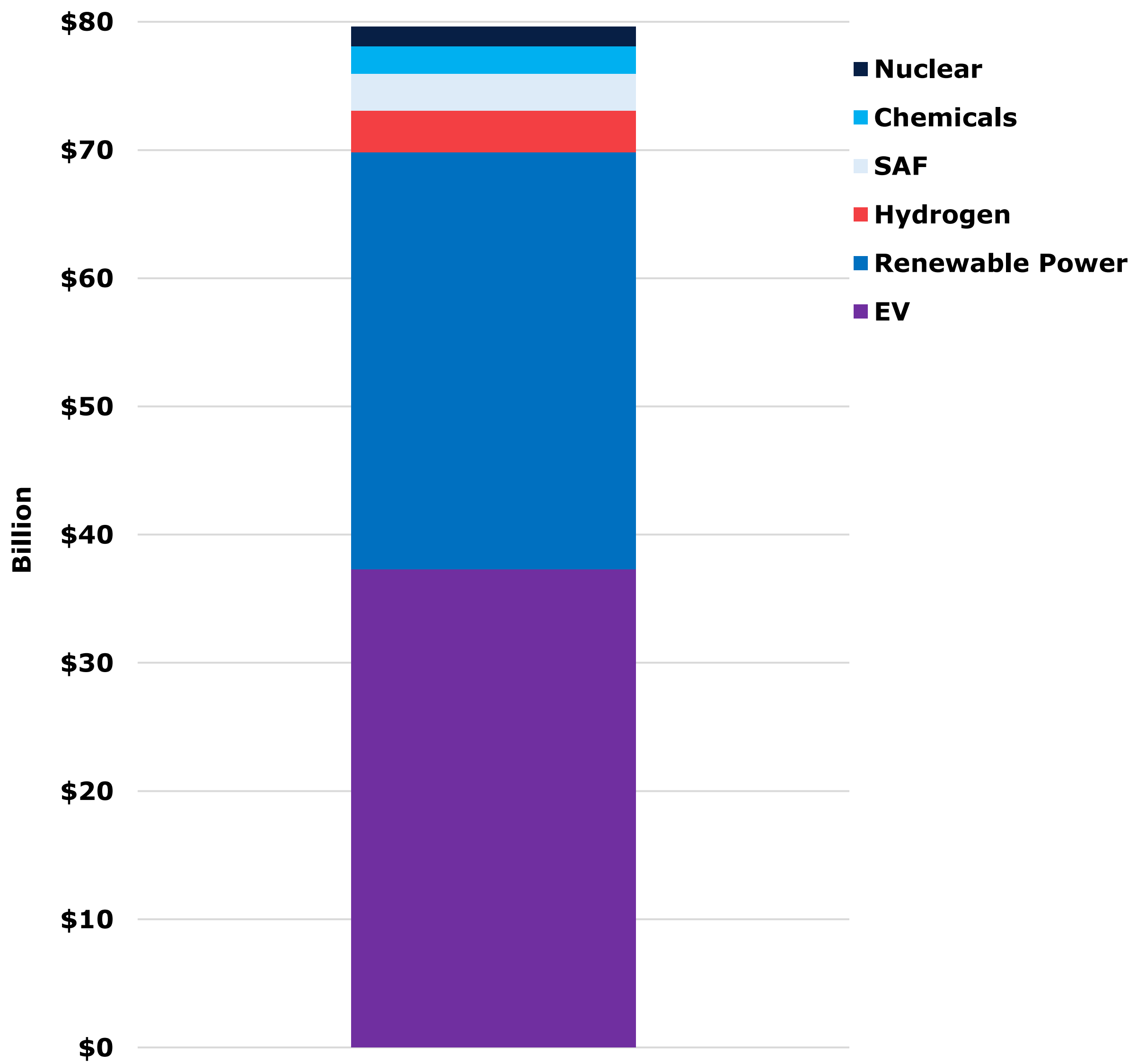
❖ Inflation Reduction Act (IRA) 45V

- *While a major refining input, aspects of the three pillars of hydrogen, like matching, have proven challenging to implement. The power commitment for green hydrogen weighs heavily on cost and is not offset by IRA provisions. Final rules published by Treasury help clarify these concerns.*
- **Final Clean Hydrogen Tax Credit Rules:** The U.S. Treasury and IRS released final rules for the section 45V Clean Hydrogen Production Tax Credit, aimed at advancing clean hydrogen projects. These updates offer flexibility to encourage industry growth while meeting emissions standards outlined in the Inflation Reduction Act.
- **Eligibility For Full Credit:** Hydrogen producers using electricity (from renewable, nuclear, or other sources), natural gas with carbon capture, renewable natural gas (RNG), and coal mine methane can now more easily determine their eligibility for the tax credit. Full credit requires adherence to prevailing wage and apprenticeship standards.
- **Emissions-Based Credit Tiers:** The credit value is based on the lifecycle greenhouse gas (GHG) emissions from hydrogen production. To qualify as "clean hydrogen," emissions must not exceed 4 kg CO2e per kg of hydrogen, with lower-emission hydrogen receiving higher credits.
- **Electrolytic Hydrogen Rules:** The final rules clarify requirements for electrolytic hydrogen (e.g., "green" or "pink" hydrogen), including specific guidelines for matching electricity consumption with renewable generation, addressing both direct and indirect emissions from hydrogen production.
- **Methane-Based Hydrogen Eligibility:** For hydrogen produced using methane (e.g., from natural gas or coal mine methane), new rules refine how methane leakage rates and lifecycle emissions should be calculated. This includes using national values or project-specific data from the EPA's Greenhouse Gas Reporting Program.
- **New Pathways For Incrementality:** The final rules expand the definition of incremental clean power to include electricity from nuclear plants at risk of retirement, and power from states with stringent GHG emissions caps and clean electricity policies. These measures aim to avoid induced emissions in hydrogen production.
- **Book-And-Claim Systems:** Starting in 2027, producers can use book-and-claim systems for certain natural gas alternatives like RNG and coal mine methane, once these systems meet regulatory standards. This change is expected to facilitate hydrogen production from a wider range of biogas and methane sources.
- **Carbon Capture and Incrementality**: The rules define "incremental" electricity as newly added or expanded capacity and include provisions for electricity from at-risk nuclear plants or those that implement carbon capture to be considered clean.
  - **W|Carbon Analysis:** Decisions made on green hydrogen will affect production options for green ammonia, and the availability of green ammonia will affect other technologies like RNG and CCS, as well as GHG reduction strategies for SAF where ammonia is part of the life cycle of crop production.

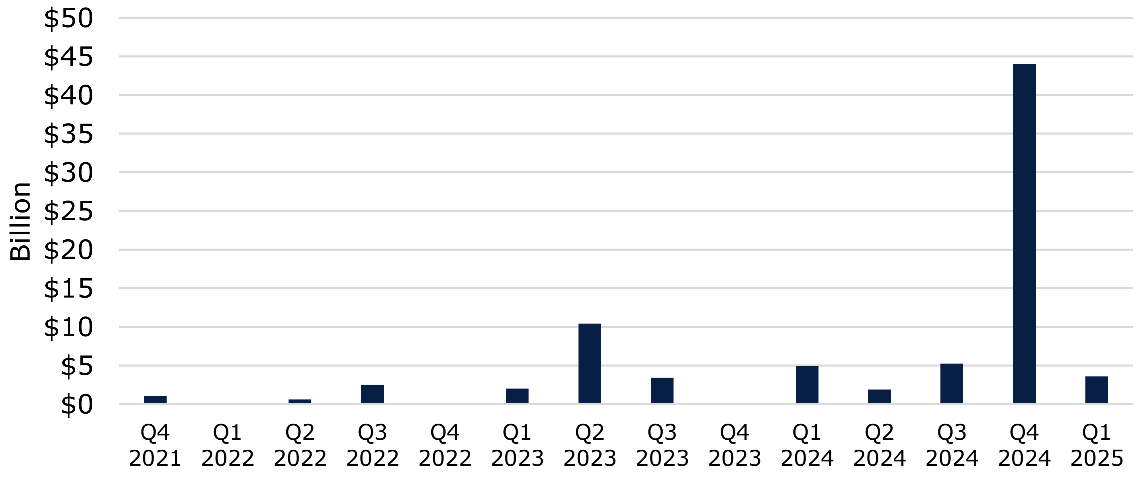
Topic	IRS Guidance	W|Carbon Analysis	Stakeholder Impacts
Blending of RNG Feedstock	Each feedstock for a separate "facility".	Prevents leveraging of Low CI RNG.	🙁
Circular Flow	Clarifies that a hydrogen production facility is defined based on functional interdependence, including all equipment that works together to produce qualified clean hydrogen, independent of the broader lifecycle GHG emissions analysis, thereby avoiding circularity.	Streamlines equipment inclusion, enabling accurate emissions and EAC allocation while avoiding a "circular loop".	🙂
Process Based Allocation	Requires emissions from hydrogen production to be allocated to co-products using either system expansion (where feasible) or physical allocation, ensuring accurate lifecycle GHG accounting while preventing artificially low emissions values.	Ensures accurate emissions accounting for hydrogen production, offering flexibility but requiring strict adherence to co-product rules and regulatory guidelines.	🙂
R&D vs. 45V GREET	Requires taxpayers to use the 45VH_2-GREET model version locked in at the facility's beginning of construction date, or if no version is locked, the latest version available at the start of the taxable year, with an option to adopt updates released within that year.	Standardizes the model usage, offers flexibility to adapt to updated versions.	😐
Avoided CH_4, Manure	-51g CO_2e/MJ for the biogas.	RNG production upgrades biogas, adding 19.4 gCO_2e/MJ, but avoids -51 gCO_2e/MJ from manure management, resulting in a net GHG intensity of -31 gCO_2e/MJ.	😐
Avoided CH_4, Coal Bed	Coal Mine methane is treated as flared gas.	No negative credit, treated same as LFG.	🙁
Wastewater	Alternative fate of the gas must assume flaring, accounting for flaring efficiency and the portion used for heating the anaerobic digester.	Could result in slight overestimates of avoided emissions in cases where methane is being productively used on-site.	😐
Three Pillars	Requires hydrogen producers to use incremental, deliverable clean electricity with annual matching allowed until 2030, transitioning to hourly matching thereafter, ensuring lifecycle emissions stay below 4 kg CO_2e/kg hydrogen.	Beneficial for hydrogen producers, offers clear rules and flexibility to access the tax credit while promoting a greener energy grid.	🙂
First Productive Use	Do not adopt a first productive use requirement but assess lifecycle GHG emissions by considering the alternative fates of methane, ensuring accountability for potential emissions without requiring detailed historical documentation.	Do not require historical data collection.	🙂
Wasteful Use	Disallows credit if hydrogen is used or sold primarily for claiming credit in wasteful manner such as unnecessary venting or flaring.	Promotes anti-abuse law.	😐

DOE Loan Guarantee Program

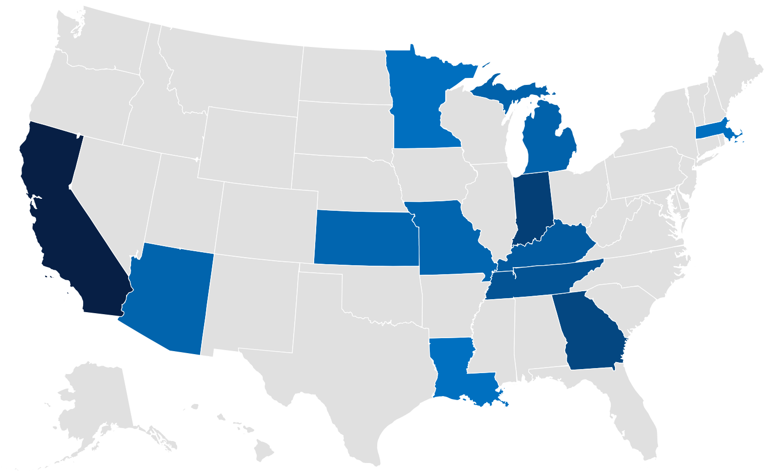
DOE Loan Guarantee Program Categories of Biden Presidency



Loan Distribution: Awards Ramping In Late 2024/Early 2025



Weighted Geographic Distribution of Loan Guarantee Awards



Source: DOE Loan Programs Office, W|Carbon Analysis of DOE Filings

- **Biden Administration works to seal legacy with DOE Loan Guarantee Program Awards: $70B of nearly $80B allocated to EV's and Renewable Power, with 66% allocation since the beginning of Q3 2024.**
  - **DOE Loan Guarantee Program** provides federal backing to innovative clean energy projects, offering loan guarantees to help overcome financial barriers. It focuses on high-risk, early-stage technologies that may not attract traditional financing, with an emphasis on reducing greenhouse gas emissions.
  - The Program was established by the Energy Policy Act of 2005 and aims to **promote energy security** and economic growth by supporting breakthrough energy technologies. It helps reduce dependence on fossil fuels and accelerates the transition to a clean energy economy, including renewables, nuclear, and advanced fossil technologies with carbon capture.
  - Under the W. Bush Administration, the program primarily supported clean coal and nuclear energy projects. The Obama administration significantly expanded the program, investing in renewable power technologies (solar, wind, geothermal) as part of its broader climate and clean energy agenda.
  - The first Trump administration's approach was **more favorable to fossil fuel and nuclear energy**. Loan guarantees during this period largely supported nuclear energy and coal projects, although the program's overall activity was less pronounced compared to the Obama era.
  - The Biden administration revived the DOE Loan Guarantee Program as part of its clean energy and climate agenda, aiming to decarbonize key sectors and create sector jobs. It predominately allocated funds to renewable power projects and electric vehicle infrastructure, aligning with its goal of achieving net-zero emissions by 2050.
  - Both the **IRA and the Bipartisan Infrastructure Law**, passed under Biden, have expanded the funding available through the loan guarantee program. These laws prioritize investments in carbon capture, green hydrogen, battery storage, and clean manufacturing, driving the DOE's loan portfolio toward decarbonization technologies.
  - A potential second Trump term could see a **shift back to fossil fuels and nuclear energy**, with less emphasis on renewable technologies and climate change mitigation. The DOE Loan Guarantee Program may prioritize energy independence, with a focus on coal, natural gas, and nuclear power, potentially revisiting "clean coal" and natural gas with carbon capture projects.
  - The future of the program will likely hinge on the broader political landscape, with funding and focus areas shifting depending on the administration in power. Regardless of leadership, the program will remain a key tool in advancing U.S. energy innovation, though the specific technologies supported will vary depending on the dominant energy policy.

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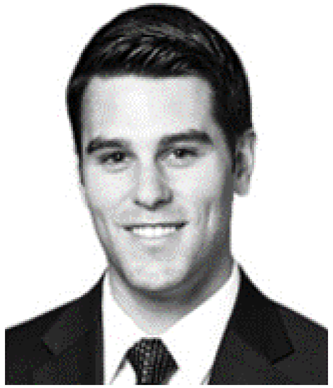

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