



**Comments of the Institute for Energy Economics and Financial Analysis to
the U.S. Department of the Treasury regarding Section 45V Credit for Production of
Clean Hydrogen; Section 48(a)(15) Election to Treat
Clean Hydrogen Production Facilities as Energy Property**

February 26, 2024

Introduction

The Institute for Energy Economics and Financial Analysis (IEEFA) provides the following comments to the Department of the Treasury, Internal Revenue Service, regarding proposed regulations relating to the credit for production of clean hydrogen (clean hydrogen production credit), as established and amended by the Inflation Reduction Act of 2022. In particular, these comments focus on the need for oversight of compliance with the eligibility requirements for credits pursuant to Section 45V and for transparency in the use of government funds.

The proposed regulations for Section 45V do not include any oversight mechanism. This is of concern, considering the December 2021 U.S. Government Accountability Office (GAO) report, [Carbon Capture and Storage: Actions Needed to Improve DOE Management of Demonstration Project](#), included findings that highlighted issues related to the complexity and feasibility of carbon capture projects as well as problems related to the waste of taxpayer dollars. The report recommended stronger oversight of any carbon capture and storage activities funded in full or in part by the government. Yet there is no evidence that any such measures will be included in the 45V regulations.

To the extent possible, the 45V regulations should include provisions that will ensure the IRS has the tools necessary to prevent waste, fraud, and misuse of taxpayer funds in these highly technical, complex projects involving technologies such as carbon capture and storage, which are unproven for large, commercial-scale facilities operating over the long-term.

IEEFA also advocates for transparency in the use of government funds. The Department of Treasury should require taxpayer disclosure of how much carbon dioxide (CO₂) is captured each year, the total project carbon dioxide-equivalent emissions (CO₂-e), the amount of hydrogen (H₂) produced, and the 45V credit tier achieved by the project. Without this transparency, the public will not know whether the taxpayer funds being distributed under 45V have been used effectively.

- 1) The three pillars for hydrogen production using electrolyzers—new supply, deliverability and hourly matching—are important for ensuring that green hydrogen production does not result in forcing more fossil-based power production into the grid. These key requirements, however, must apply to all hydrogen production pathways.**

This is crucial for electricity-intensive hydrogen production pathways such as methane pyrolysis, and also pertains to other fossil-based pathways using CCS.

- 2) **The version of the GREET (Greenhouse Gases, Regulated Emissions, and Energy Use in Technologies) model used to calculate CO₂-e for 45V (45V GREET) must be based on CO₂ stored or used, not CO₂ captured.**
- 3) **As proposed, 45V does not align with existing 45Q regulations for verification of carbon oxide transport, permanent storage or use, or for monitoring.**

Under the proposed regulations as written, a taxpayer who elects to take advantage of the comparatively lax verification requirements in 45V must prove capture of CO₂ at a facility—but bears no responsibility for demonstrating proper management or storage.

- a) The 45V regulations must be strengthened to include provisions for verifying carbon management that are at least as strong as 45Q. Future updates to 45V and 45Q should be consistent to ensure taxpayers are not subject to different carbon management rules.
 - b) 45V contains no provisions to verify proper sequestration or prevention of CO₂ leaks. 45Q, by contrast, requires a qualified engineer or geologist's report in the case of permanent sequestration. For enhanced oil recovery (EOR), 45Q requires that a petroleum engineer's inspection must be filed to verify that carbon oxides have been permanently stored.
 - c) 45V does not sufficiently explain the duties of the holder of the credit and parties who contract to produce, transport, or store the carbon oxides. 45V must include clarification for scenarios in which the hydrogen producer captures CO₂ at a facility but does not manage the CO₂ through to its end use or storage. If there are leaks *en route* or after storage deposit, 45V must specify whether the hydrogen producer's credit should be adjusted or if any penalty should apply. If the producing entity is awarded the production tax credit for hydrogen produced and the CO₂ is mismanaged by contracted entities, situations may occur in which none of the CO₂ captured is permanently stored but a taxpayer has won a credit as if it had been stored. This situation could lead to deceptive "catch-and-release" carbon management schemes.
 - d) 45V contains no provision to claw back credits if monitoring of secure storage, EOR, or other use reveals substantial or complete leakage.
- 4) **The Department of the Treasury asks whether taxpayers can complete all of the requirements for claiming 45V within a tax year and, if not, what alternatives are better?**

If the determination of a total CO₂-e value for fossil-based hydrogen is dependent on tonnes of CO₂ stored or utilized, it is reasonable to expect that taxpayers can complete all documentation and verification requirements within a tax year to provide estimates of the actual amount of CO₂ captured and subsequently stored or used. However, those figures should not be considered final.

- a) If CO₂ is stored or used for EOR, taxpayers should provide proof of at least three years of injection-site monitoring by an independent geologist or petroleum engineer. Evidence of leaks should be evaluated against total CO₂-e estimated at the time of credit award.
- b) If leakage is significant enough to result in a change in credit tier, there must be a claw back mechanism in place. If a contracted party is responsible for the CO₂ storage, the

45V regulations must be clear about the impact of a claw back on the taxpayer that claimed the 45V credit.

5) The lifecycle analysis (LCA) envelope for hydrogen includes carbon management, but that component of the LCA is not adequately addressed in the draft 45V regulations.

Currently, 45V GREET reflects a single scenario for CO₂ management and storage (200-mile pipeline with one booster station and permanent geologic storage in a saline formation). Some projects are planning to move CO₂ hundreds of miles, and not all projects are aiming for injection in a saline formation.

- a) 45V GREET carbon management scenarios must differentiate between CO₂ storage and CO₂ use in EOR. Leakage rates for EOR scenarios are different than those for permanent geologic storage and should be applied to the CO₂-e calculation.
- b) CO₂ management scenarios in 45V GREET should require additional user input to correctly attribute emissions related to carbon management and storage or use. Taxpayers should provide information for CO₂ transport distance, CO₂ compression pressure, number of boosting stations, and CO₂ amount injected for permanent geologic storage or EOR.
- c) Verification of the quantity of stored CO₂ should be made by an independent geologist in the case of underground sequestration, and a petroleum engineer in the case of EOR. Verification should take the form of measurement of CO₂ injected at a site, minus any leakage at the wellhead.
- d) For CO₂ that is captured and used for any purpose other than EOR, any compression and transport included by the taxpayer in the delivery of the CO₂ should be accounted for in the 45V GREET CO₂-e calculation. Taxpayers should provide information for CO₂ transport distance, CO₂ compression pressure, number of boosting stations, and CO₂ amount delivered.
- e) Estimated leakage rate at the site(s) of the injection should reflect the entire amount estimated for a 100-year timeframe, and all emissions should be applied to the calculation of CO₂-e for the hydrogen that is injected in the tax year for which the credit is issued. Leakage rates should reflect injection for EOR or permanent geologic storage.
- f) Estimates for emissions related to the compression for onsite storage or transport of hydrogen to an offtaker should be included in the well-to-gate CO₂-e calculation. The current LCA envelope ends with hydrogen at a very low pressure (20 bar). This pressure is only reasonable if the gas is expected to be used onsite or at a facility immediately adjacent to the production facility. In all other cases, taxpayers should provide a weighted average pressure value for entry into 45V GREET. This value should be based on the actual offtake contracts, as examined by the qualified verifier. Any hydrogen for which tax credit is claimed that is stored onsite for any period of time should also be included in the weighted average calculation of pressure.

6) As the foundation for determination of 45V credits, the 45V GREET model should be updated to reflect realistic values for fixed parameters underlying emissions estimates.

Based on IEEFA's [research](#), the following updates should be made:

- a) Upstream methane emissions estimates should represent region- or basin-specific rates and should be updated annually based on current, published scientific studies and data collected by federal agencies.
 - b) Global warming potential (GWP) values should be presented in both 20- and 100-year time horizons. We strongly advocate for the use of 20-year GWP values in the calculation of total CO₂-e and 45V credit tier determination.
 - c) A GWP value for hydrogen should be incorporated into all future versions of GREET, including 45V GREET, to account for the climate-warming impact of hydrogen leakage.
 - d) Carbon management scenarios must be reflected accurately in 45V GREET to ensure 45V credit tier determination is made based on carbon stored or used, rather than carbon captured.
- 7) We recognize that the IRS is hamstrung by the provision in the Inflation Reduction Act that a lifecycle analysis for production of hydrogen ends at the back gate of the production facility except for the limited issue of CO₂ management, and therefore does not represent a full lifecycle analysis.**

The Treasury Department should inform Congress that this limitation should be addressed, and also that the carbon intensity of hydrogen should be measured from cradle to grave, so that all CO₂-e emissions will be considered when determining the carbon intensity of hydrogen.