THE MIDWEST HYDROGEN CENTER OF EXCELLENCE

A Key Initiative of the Renewable Hydrogen Fuel Cell Collaborative

February 23, 2024

The Honorable Janet Yellen
U.S. Department of the Treasury
1500 Pennsylvania Avenue NW
Washington, DC 20220

The Honorable Jennifer Granholm
Secretary of Energy
U.S. Department of Energy
1000 Independence Avenue SW
Washington, D.C. 20585

Douglas W. O'Donnell
Deputy Commissioner for Services and Enforcement
CC:PA: LPD:PR (REG–117631-23)
Room 5203
Internal Revenue Service
P.O. Box 7604
Ben Franklin Station
Washington, DC 20044

Re: Section 45V Credit for Production of Clean Hydrogen; Notice of Proposed Rulemaking and Notice of Public Hearing, 88 Fed. Reg. 89,220 (Dec. 26, 2023)

Dear Mr. O'Donnell and Secretaries Yellen and Granholm:

The Midwest Hydrogen Center of Excellence (MHCoE) hereby submits the following comments in support of efforts to draft language defining what forms of clean hydrogen production will be eligible for tax credits under Section 45V. The MHCoE is operated by the Stark Area Regional Transit Authority (SARTA) in Canton, Ohio, together with Cleveland State University.[1]

The MHCoE is committed to the rapid transition to a clean hydrogen economy, especially for the transportation sector. MHCoE's commercialization research and SARTA's experience with hydrogen fuel cell bus fleets both point to the need for tax credits that support decarbonization of hydrogen from steam methane reforming. The need to transition our energy economy to hydrogen is urgent. If we rely primarily upon electrolysis and other renewable sources for clean hydrogen, it will take too long to develop. Accordingly, the 45V tax credit rules should be written to encourage hydrogen generation from

[1] The MHCoE is a hydrogen transit commercialization research and education outreach center funded by Stark Area Regional Transit Authority (SARTA), with support from the Federal Transit Administration and other grants. The MHCoE is managed for SARTA by the Energy Policy Center at the Levin College of Public Affairs at Cleveland State University. SARTA operates a fleet of 20 hydrogen fuel cell buses together with a hydrogen refueling station at its depot in Canton, Ohio – the largest hydrogen bus fleet outside of California.

steam methane reforming. This is especially so for the smaller scale steam methane reformation facilities that are likely to be the source of hydrogen for vehicle refueling infrastructure, but is unlikely to qualify for 45Q tax credits.

According to the Department of Energy's Hydrogen Shot projections, up to 2/3 of the cost of hydrogen at the pump today consists of delivery, compression, storage and dispensing costs. The best way to constrain such costs (as well as emissions) is to make the hydrogen nearby.

Such locally generated hydrogen for the refueling market will likely be small (e.g. 500-3000 kg/day). Carbon dioxide captured and sequestered therefrom will not qualify for 45Q credits; 45Q requires sequestering 12,500 metric tons of CO2 per facility per year. A 1000 kg/day Steam Methane Reforming (SMR) facilities will likely generate around 3000 metric tons per year. Accordingly, 45V tax credits will be important to enabling clean hydrogen refueling infrastructure.

SARTA, which operates one of the largest fuel cell bus fleets in the nation, currently uses liquified gray hydrogen shipped by truck from Sarnia, Ontario to Canton, Ohio.[2] Making hydrogen onsite through electrolysis will not be economically feasible near term, even with the maximum $3/kg tax credit. Rapid adoption of hydrogen for refueling infrastructure will require the continued use of hydrogen derived from SMR technology. Locally generated hydrogen will reduce the carbon footprint of SARTA's bus fleet by reducing trucking required for delivery.

SARTA can produce gray hydrogen nearby, but 45V production tax credits for SMR-derived hydrogen will be critical to commercial viability of clean hydrogen refueling infrastructure. Moreover, rapid adoption of hydrogen markets supplied by SMR will catalyze the development of electrolysis and renewable natural gas technologies. Increase in the demand for hydrogen refueling will bring down the costs of hydrogen transportation, storage and dispensing -- currently the biggest obstacle to hydrogen refueling infrastructure adoption.

Yet the proposed new rules do not sufficiently encourage clean hydrogen development from SMR. Examination of blue hydrogen strategies (SMR of fossil gas with CCS) under the Greet Model proposed in the December 2023 rules indicate that blue hydrogen will qualify for at best $0.60/kg. Further, it is unclear that RNG would qualify for any credit, absent CCS. Our estimates indicate that scope 3 emissions from gathering and processing RNG would require CCS to qualify for the tax credits (see chart below). The MHCoE accordingly recommends that the IRS use a phased in approach for scope 3 emissions similar to that adopted by the Security and Exchange Commission to ensure more rapid adoption of RNG and hydrogen generation near refueling infrastructure.

[2] SARTA currently uses around 400 kg/day of H2.

45V2-GREET Emissions by Scope: H2 from SMR

SMR of RNG without CCS

Emissions Type	Description	Calculated GHGs (kg of CO2e/kg of H2)	Share of GHGs
Scope 1	Direct emissions at SMR plant with credit for using LFG that would have otherwise been flared	0.01 (net)	0.3% (net)
Scope 2	Electricity to runs SMR plant	0.25	5.5%
Scope 3	Gathering and processing RNG	4.24	94.2%
	TOTAL	**4.50**	**100%**

SMR of fossil gas with CCS

Emissions Type	Description	Calculated GHGs (kg of CO2e/kg of H2)	Share of GHGs
Scope 1	Direct facility emissions at SMR plant with credit for captured CO2	0.43 (net)	13.5% (net)
Scope 2	Electricity to runs SMR plant	0.25	7.7%
Scope 3	Gathering and processing fossil gas	2.53	78.8%
	TOTAL	**3.21**	**100%**

- Majority of emissions for purposes of 45V are Scope 3.
- SMR of fossil gas with CCS in this example qualifies for $0.60/kg of H2 under 45V.
  - CO2 yield of 10.63 metric tons per metric ton of produced hydrogen.
  - At $85 per metric ton under 45Q, CO2 yield translates to $0.90/kg of hydrogen.
  - 45Q likely favorable to 45V for SMR of fossil gas with CCS.

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Our projections for hydrogen use in Ohio by 2050 suggest that, even if Ohio repurposed 15% of its nuclear and renewable power to making hydrogen, the vast majority of the 2 million metric tons of hydrogen needed will still have to come from natural gas. Rapid deployment of clean hydrogen will require early constraint of Scope 3 carbon charges against SMR. The December 2023 guidelines may fail to catalyze the small scale clean hydrogen generation required for transportation infrastructure, and fail to catalyze development of RNG.

For these reasons, the MHCoE recommends that the IRS consider phasing in Scope 3 emission charges to steam methane reforming under the 45V production tax credits.

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