Greetings,

We are pleased to offer the newest installment of the Energy Systems and Climate Analysis (ESCA) newsletter.

This newsletter highlights the release of EPRI's new white paper on the impact of the Inflation Reduction Act's 45V Hydrogen Tax Credits. Read on to learn more.

All of ESCA's publicly available work, and past announcements, can be found on the ESCA website.

ESCA Research Highlights

Impacts of IRA's 45V Clean Hydrogen Production Tax Credit

A new EPRI study "**Impacts of IRA's 45V Clean Hydrogen Production Tax Credit**" was published today. Geoff Blanford and John Bistline led this analysis using EPRI's **US-REGEN** model to quantify potential impacts of the Inflation Reduction Act (IRA) 45V hydrogen tax credits under scenarios that vary qualification criteria and the scope of the demand response for hydrogen.

Hydrogen and low-carbon fuels could play important roles in reaching economy-wide net-zero emissions, especially for applications in industry, transport, and energy storage. But IRA's novel tax credits for clean hydrogen can have complex impacts on hydrogen production, electric generation, and emissions. This analysis expands our understanding of 45V impacts by using a full energy systems model—encompassing fuel production, transport, storage, and use—to capture hydrogen demand feedbacks outside of the power sector as well as the dispatch dynamics of grid-connected electrolysis.

The analysis finds that:

- **45V credits could lead to significant deployment of electrolytic hydrogen,** even with more stringent qualification criteria including hourly matching of zero-carbon electricity generation and electrolysis production. Electrolytic hydrogen production could range from 13-24 MtH_2 annually by 2035 (compared with about 10 MtH_2 of total hydrogen production today, which is largely from conventional steam methane reforming). 45V-induced hydrogen demand is largely for electric generation and

blending into existing natural gas pipelines, which are more flexible demands that can be reversed if incentives change after tax credits expire.

- **Net effects of 45V on economy-wide emissions depend on qualification criteria.** 45V may lead to a net decrease or a net increase in economy-wide CO_2 emissions during the subsidy period, relative to a scenario without 45V credits. In this analysis, all three qualification pillars—hourly temporal matching, use of new generation resources, and local deliverability—are required for net economy-wide CO_2 reductions from 45V across all scenarios during the subsidy period. As shown in the figure below, less stringent qualification criteria could result in net CO_2
- **45V credits could entail cumulative fiscal costs of $385 to $756 billion** (in real 2022 dollar terms), although only 13-25% of this cost occurs during the 10-year budget period ending in 2032. The cumulative fiscal outlay per cumulative t-CO_2 reduced for 45V could exceed $750/t-$CO_2$, which is an order of magnitude higher than other IRA provisions.

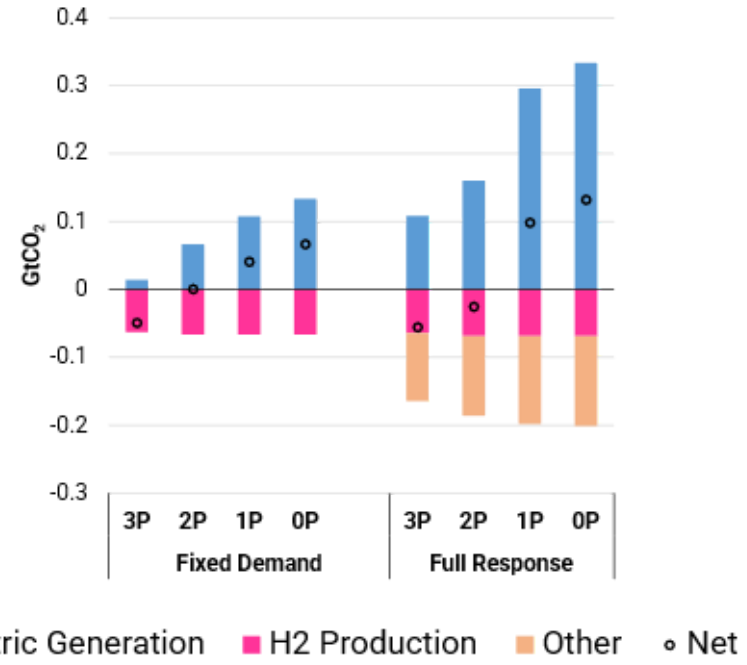

***Figure: Change in 2035 CO_2 Emissions in Hydrogen Demand Scenarios vs. No 45V Case**, assuming different qualification criteria. 3P includes requirements for hourly matching, new clean generation, and deliverability; 2P removes hourly matching; 1P removes hourly matching and new generation requirements; and 0P removes all three pillars. Fixed Demand assumes no incremental non-electric hydrogen demand, while Full Response includes non-electric demand feedbacks.*

This study was funded by the **Low-Carbon Resources Initiative** and is free to download. Modeling for this analysis leverages capabilities developed for the LCRI **Net-Zero 2050 study**. It also builds on ESCA research and feedback from members on **earlier analysis of the Inflation Reduction Act**.

The white paper is free and publicly available on epri.com at:
https://www.epri.com/research/products/000000003002028407

For more information, please contact John Bistline JBistline@epri.com and Geoff Blanford GBlanford@epri.com

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Member Center

EPRI's Energy Systems and Climate Analysis group conducts its research as part of EPRI Programs 178 (*Resource Planning for Electric Power Systems*) and 201 (*Energy, Environmental, and Climate Policy Analysis*). Examples of recent program-specific research includes:

- Inflation Reduction Act Power Sector Tax Credit Selection and Technology Strategy (3002027792) - Program 178 and Program 201
- Harmonized Carbon Capture Costs for Integrated Modeling (3002026706) - Program 178
- Emissions and Energy Impacts of the Inflation Reduction Act (3002026641) - Program 201

For more information about these programs, please contact Nidhi Santen (P178) or David Young (P201).

Thank you for your continued interest in our work. If you have any questions please email eea@epri.com.

Best,
EPRI Energy Systems and Climate Analysis Group

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