Implementing the 45V Clean Hydrogen Tax Credits

Stakes, Risks and Solutions

Rachel Fakhry

Policy Director for Emerging Technologies, NRDC

Key Points

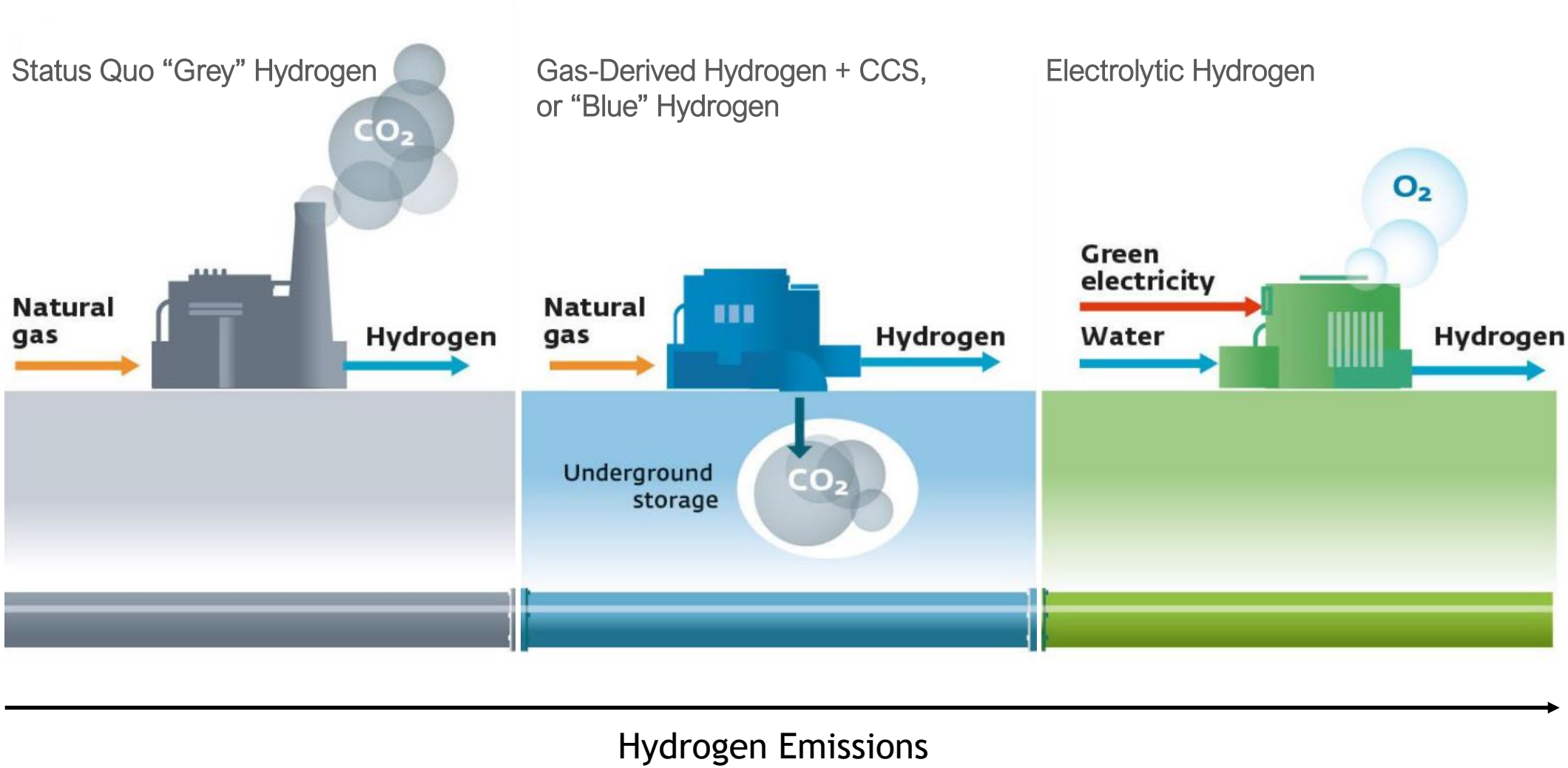
- High stakes: billions of $$ and potential hundreds of tons of carbon emissions
- It all hinges on the Biden administration
- Rigorous guardrails are necessary in the form of the three pillars – new clean supply, hourly matching, deliverability

The three pillars:

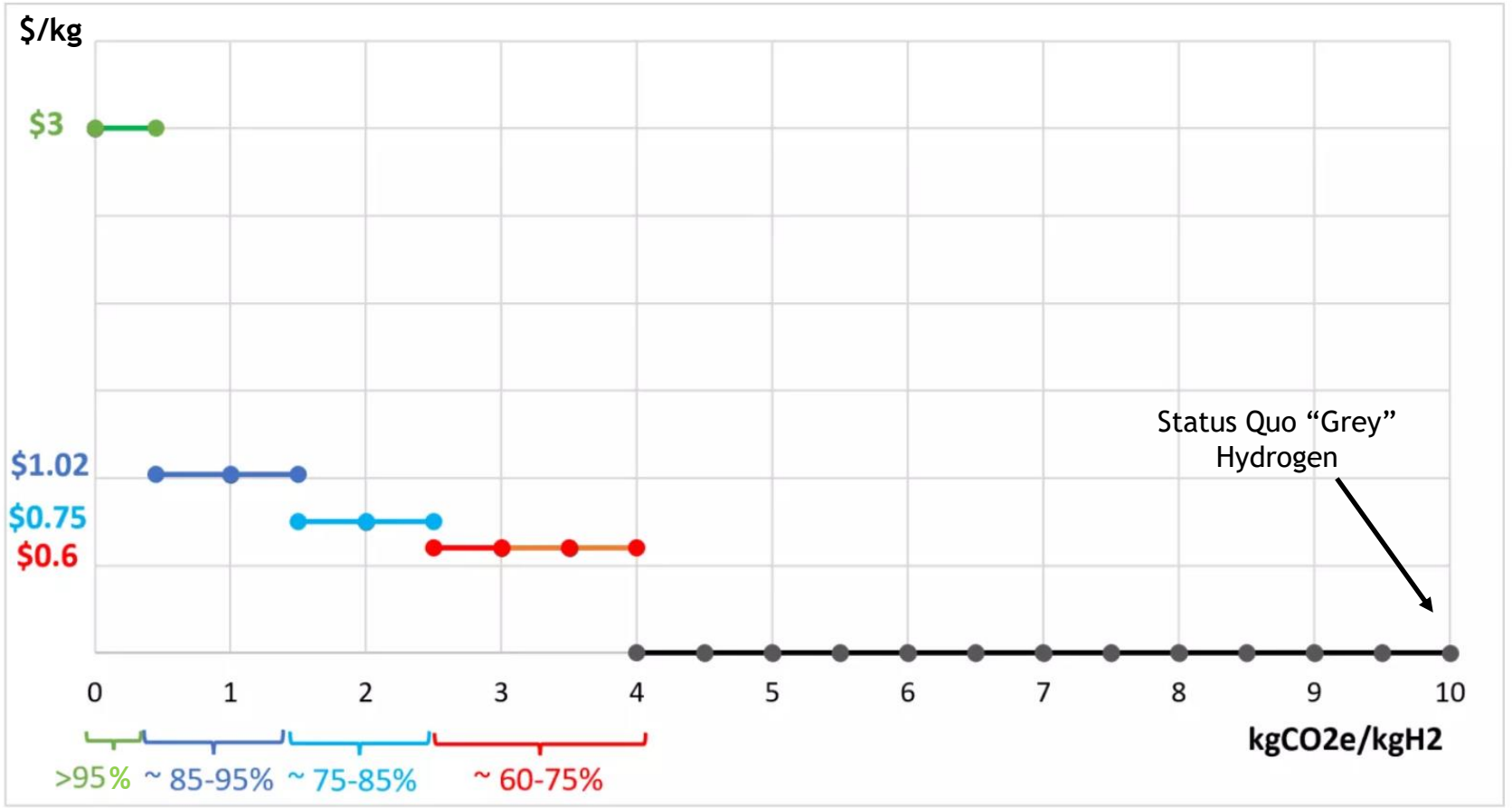
- Are necessary to prevent significant emissions increases and meet the IRA's requirements
- Will support robust industry growth
- Require simple reporting

CONTEXT SETTING

Hydrogen production sources



What is the 45V clean hydrogen tax credit?



Production tax credit in $ per kilogram of hydrogen produced ($/kg) relative to the carbon intensity of the produced hydrogen in kilograms of carbon dioxide equivalent per kilogram of hydrogen (kgCO2e/kgH2).

45V is a substantial and long-lived subsidy

- More than $100B over its lifetime
- AES/Air Products project in Texas: $3 Billions in subsidies *(Energy Innovation estimate)*
- Very long lived (~2045)

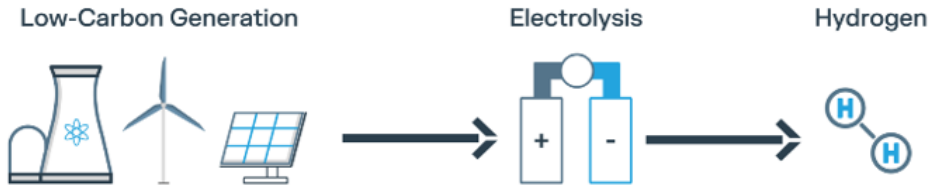
The implications of 45V hinge on Treasury, DOE, EPA and the White House

- Subsidy tied to the lifecycle GHGs of hydrogen production
- Treasury directed to issue guidance for calculating the lifecycle GHGs of hydrogen projects, within one year of the IRA's enactment
- DOE, EPA, and the White House are closely engaged
- Treasury guidance expected by August 2023

COMPLEXITY AND RISKS

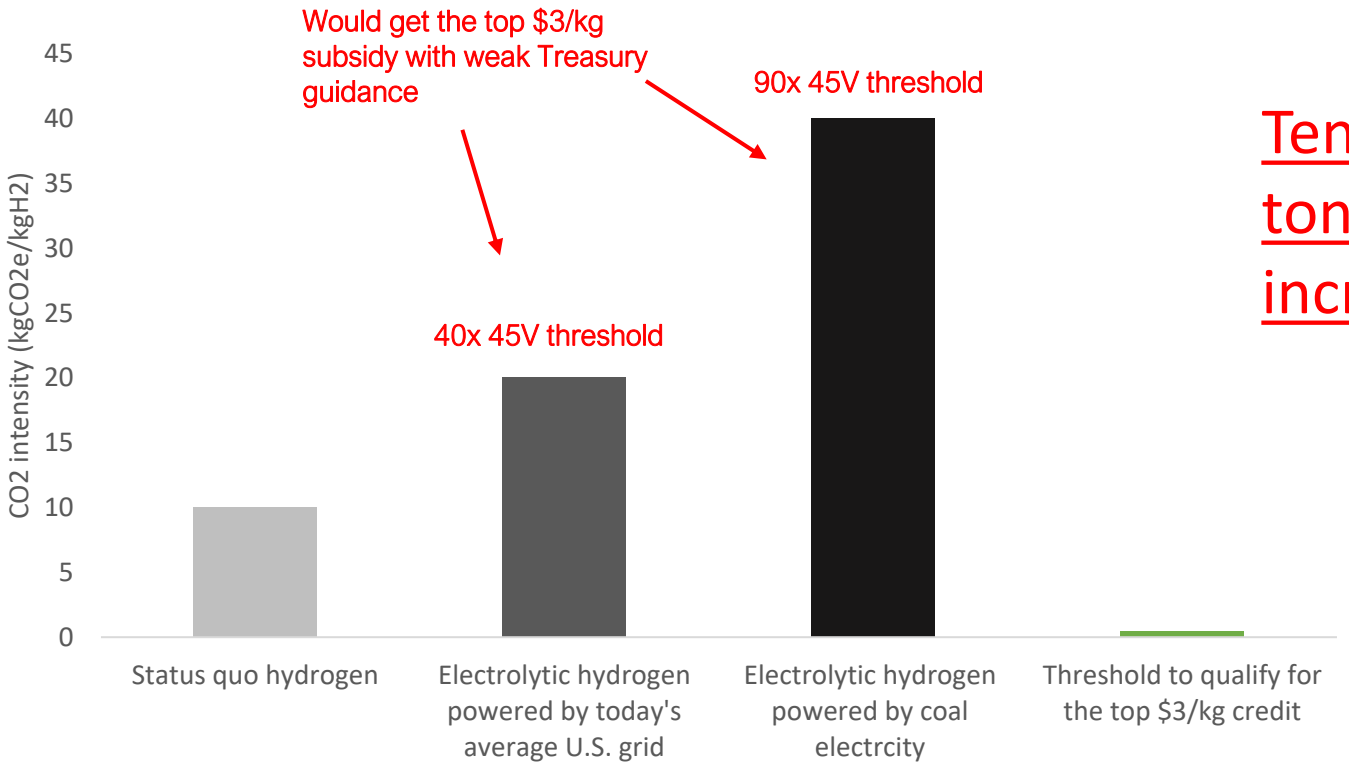
Hydrogen projects range in complexity; projects need rigorous rules

- Calculating lifecycle GHG emissions can be quite tricky
- The complexity varies from project configuration to another
  - EASY: “Behind the meter”, not drawing power from the grid
  - MORE COMPLICATED: Grid-connected, drawing grid power, buying credits
- Need rigorous rules around those credits



High risks of 45V *increasing* emissions if Treasury guidelines are weak

- Electrolysis is an electricity hungry process (more than 25% of electricity is lost in the process)
- Even small shares of fossil fueled electricity powering electrolysis would result in significant emissions



Tens to hundreds of millions of tons of potential emissions increases in this decade.

IRA STATUTORY REQUIREMENTS

The IRA text is clear: lifecycle emissions include *systemwide* emissions

- NRDC-Clean Air Task Force legal analysis
- IRA defines a hydrogen project's lifecycle emissions by referencing section 211(o)(H)(1) of the Clean Air Act (implements the federal Renewable Fuel Standard)
- Section 211 requires EPA to account for direct emissions and ***significant indirect emissions***
- EPA has interpreted significant indirect emissions to include **system impacts**
- The analogy to 45V is clear:
  - Effectively requires Treasury to **account for the *systemwide* emissions of hydrogen production, i.e., induced grid emissions**
  - For example, if a hydrogen project drives increased fossil fuels on the grid, ***Treasury must account for those emissions***.

THE THREE PILLARS

The three pillars: why do we need them?

- Three pillars = parameters/guardrails around the credits

- **Necessary to ensure prevention of grid emissions increases and meet IRA statutory requirements**
  - Substantial evidence base:
    - Princeton University's ZERO Lab; Energy Innovation, Rhodium Group, MIT Energy Initiative
    - Upcoming study by Evolved Energy Research

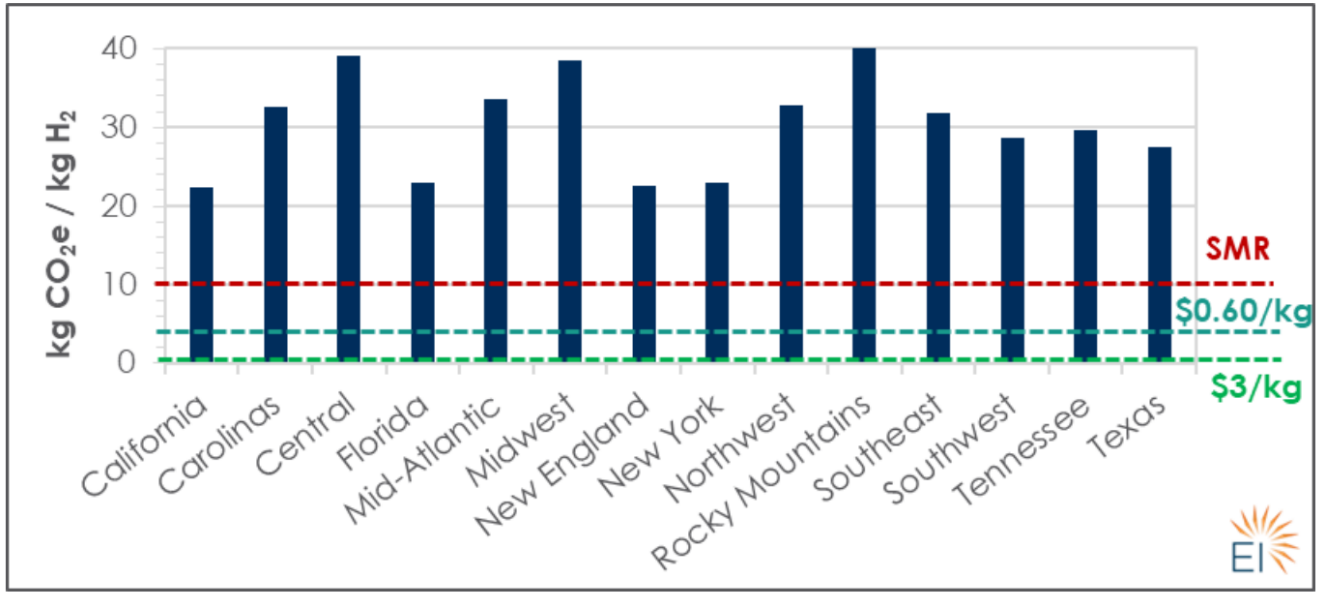
New clean supply

- New clean supply (aka, additionality): a hydrogen project must be powered by a clean energy project not currently on the grid
- Alternative: hydrogen projects can locate on the grid, add significant demand without adding new clean supply to meet that demand
- **Straightforward implementation**:

Multiple options, including (*not limited to*):

  - A hydrogen developer enters into a power purchase agreement with one or more new clean energy projects (e.g., new wind and/or solar project)
  - A hydrogen project purchases credits from a clean energy project built within 36 months of hydrogen project (EU approach)

Figure 6. Electrolysis emissions impact of forgoing additionality

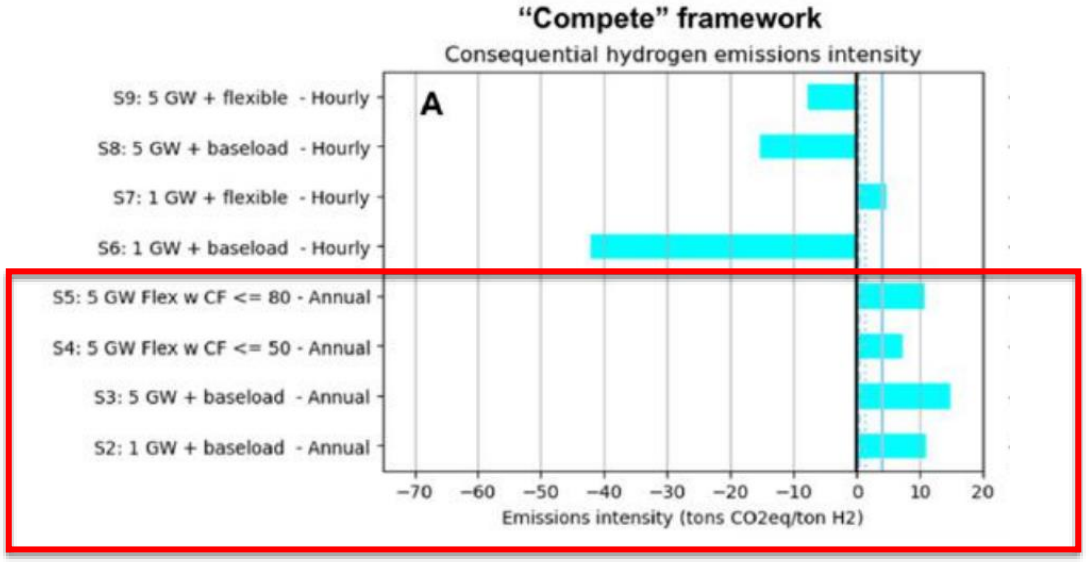


Hourly matching

- Hourly matching: a hydrogen project can only operate ***during the same hours*** where the procured new clean energy project operates
- Alternative: Annual matching, a hydrogen's project's *annual* operations must match a clean energy projects *annual* generation, on a volumetric basis

→ will spur increased fossil fuel generation

- **Straightforward implementation:**
  - A hydrogen producer demonstrates that its hourly operations match the hourly operations of a new clean energy project (either via books and records, or via credits)



MIT Energy Initiative

Not new: The clean energy market is moving away from annual matching

SUSTAINABLE BUSINESS

Carbon Accounting Changes Could Lift Corporate Greenhouse-Gas Emissions

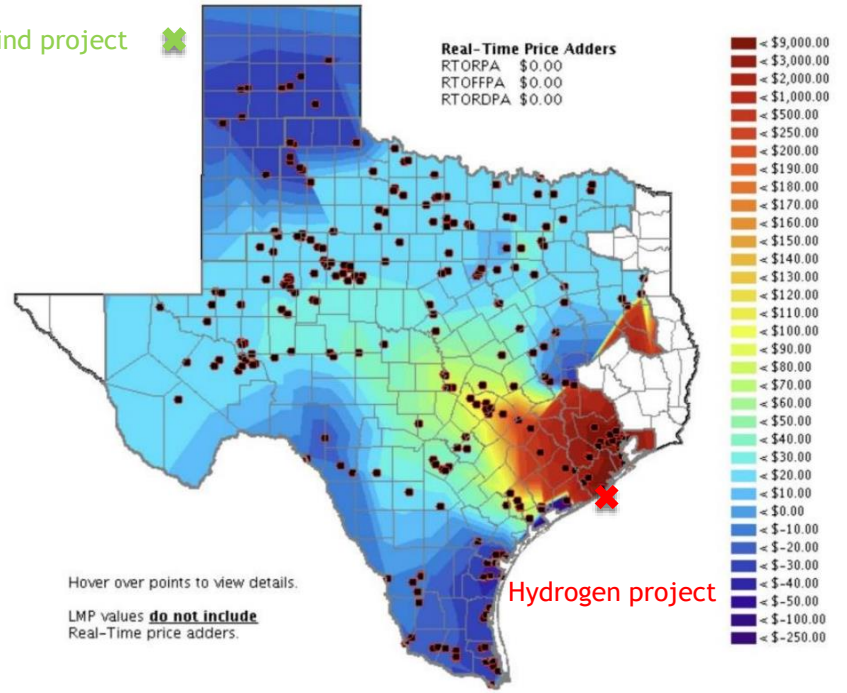
Some multinationals might be underestimating their emissions by close to 50% under current rules

- Voluntary movement away from annual matching to more accurate practices that truly confirm that operations support new clean energy deployment, e.g., hourly matching operations (Volts podcast, Dave Roberts)

Deliverability

- Deliverability: the new clean energy project(s) must be physically deliverable to the location where the hydrogen project is located
- Alternative: no geographic/spatial requirements
- **Straightforward implementation:**
  - A hydrogen project and clean energy project must be located within specific boundaries (e.g., DOE congestion zones)

Figure 8. Example of transmission congestion in the Texas power market



Dark red reflects high power prices while dark blue reflects low-to-negative power prices. The differential represents transmission congestion between these locations on the power grid.

Simple reporting for a vast majority of hydrogen projects

Hourly operations

+

PPA/contractual agreement and/or hourly credit (which already shows the date and location of the clean energy project, as well as the hour of generation)

FINANCIAL VIABILITY

Announced projects show that the three pillars are economically viable

- AES and Air Products will build a behind-the-meter facility in Texas, ramping up and down their electrolyzers based on availability of wind and solar power
- Hystor is planning a similar project with underground hydrogen storage in Mississippi
- Growing global pipeline

News | December 9, 2022

Air Products and AES to build $4bn hydrogen facility in Texas

The project includes around 1.4GW of wind and solar power capacity.

Strong analytical evidence that the three pillars will support robust industry growth

- 6 studies concluding that 3 pillar-compliant projects can be very cost-competitive from the outset, including by:
  - Academics (Princeton and MIT Energy Initiative);
  - Electrolyzer OEMs (Electric Hydrogen);
  - Two renewable energy developers;
  - Research groups (Energy Innovation)

Summarized in this Princeton white paper.

- Upcoming Evolved Energy Research study confirms that electrolyzer deployment through 2030 is nearly identical under loose rules vs. three pillars

THANK YOU!