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# HYDROGEN: MORE THAN A MOLECULE

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## WHAT IS CODE SECTION 45V?

Per-kg tax credit for  
**the person who produces (in the U.S.)**  
**hydrogen (with sufficiently low CO<sub>2</sub>e)**  
**at a qualified facility**  
**(primarily) for sale or use**

## HYDROGEN (WITH SUFFICIENTLY LOW CO2E)

- Focus is on emissions to produce hydrogen
- A third party must validate amount and CO2e score of hydrogen produced
- Start with baseline emissions based on source of inputs
  - Typical inputs: water, natural gas
- Improve score with three pillars:
  - Additionality
  - Regionality
  - Temporality/time

BUT WHAT ABOUT...?

The electricity?

The natural gas?

The storage?

The manufacturing?

The vehicles?

Ammonia?

Methanol?

SAF?

The carbon dioxide?

## WHAT IS CODE SECTION 45Q?

Per-MT tax credit for  
**the person who captures (in the U.S.)**  
**“carbon oxides”**  
**at an industrial facility or using direct**  
**air capture**  
**and geologically sequesters it, uses it**  
**as a tertiary injectant, or “utilizes” it**

## BUT WHAT ABOUT...?

The electricity? – Sections 45, 48, 45Y, 48E

The natural gas? – Section 48, 45Z

The storage? – Section 48

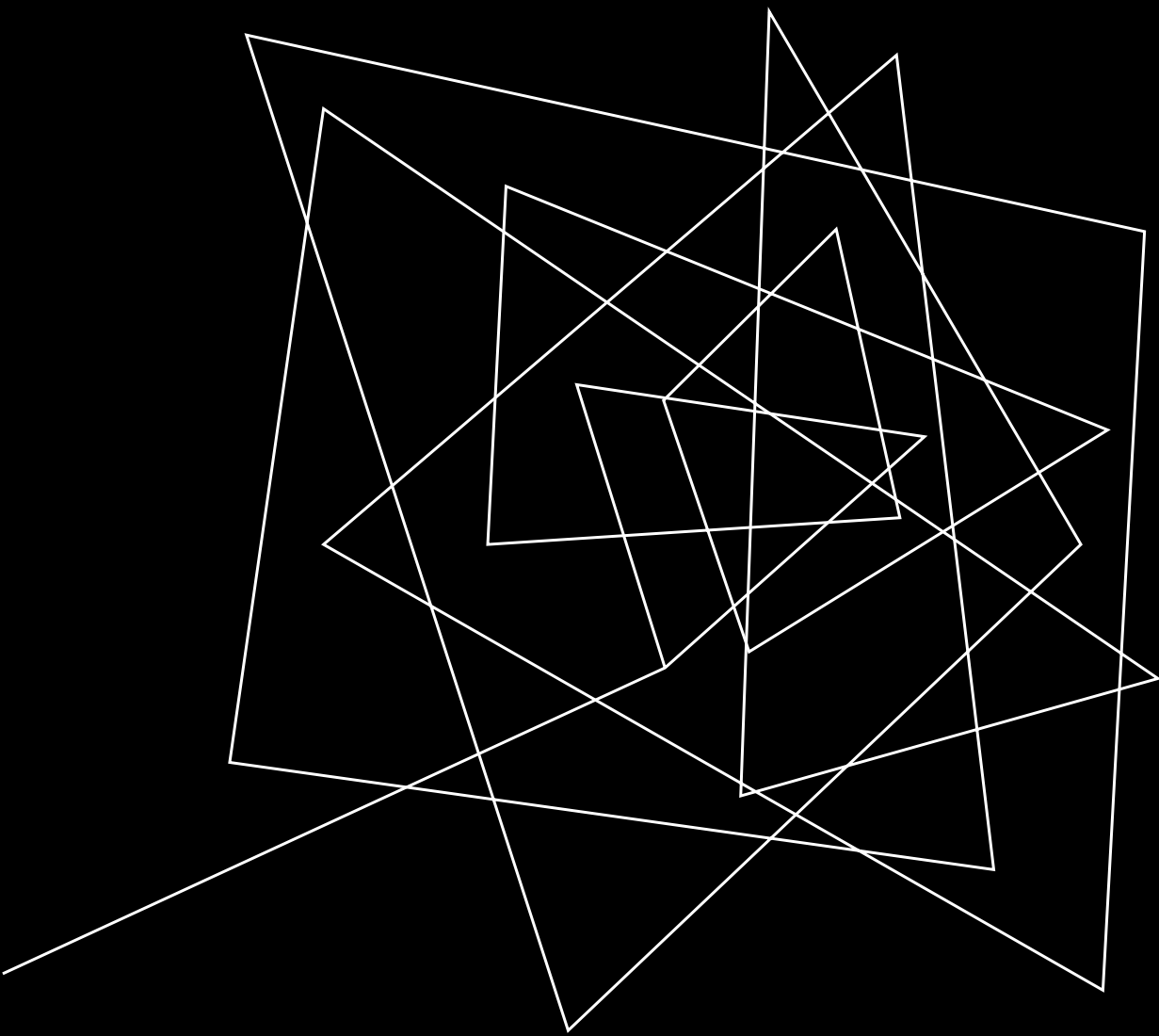
The manufacturing – Section 48C

The vehicles – Sections 30C, 30D, 45W

Ammonia? – Section 45Z?

Methanol? – Section 45Z?

SAF? – Section 45Z



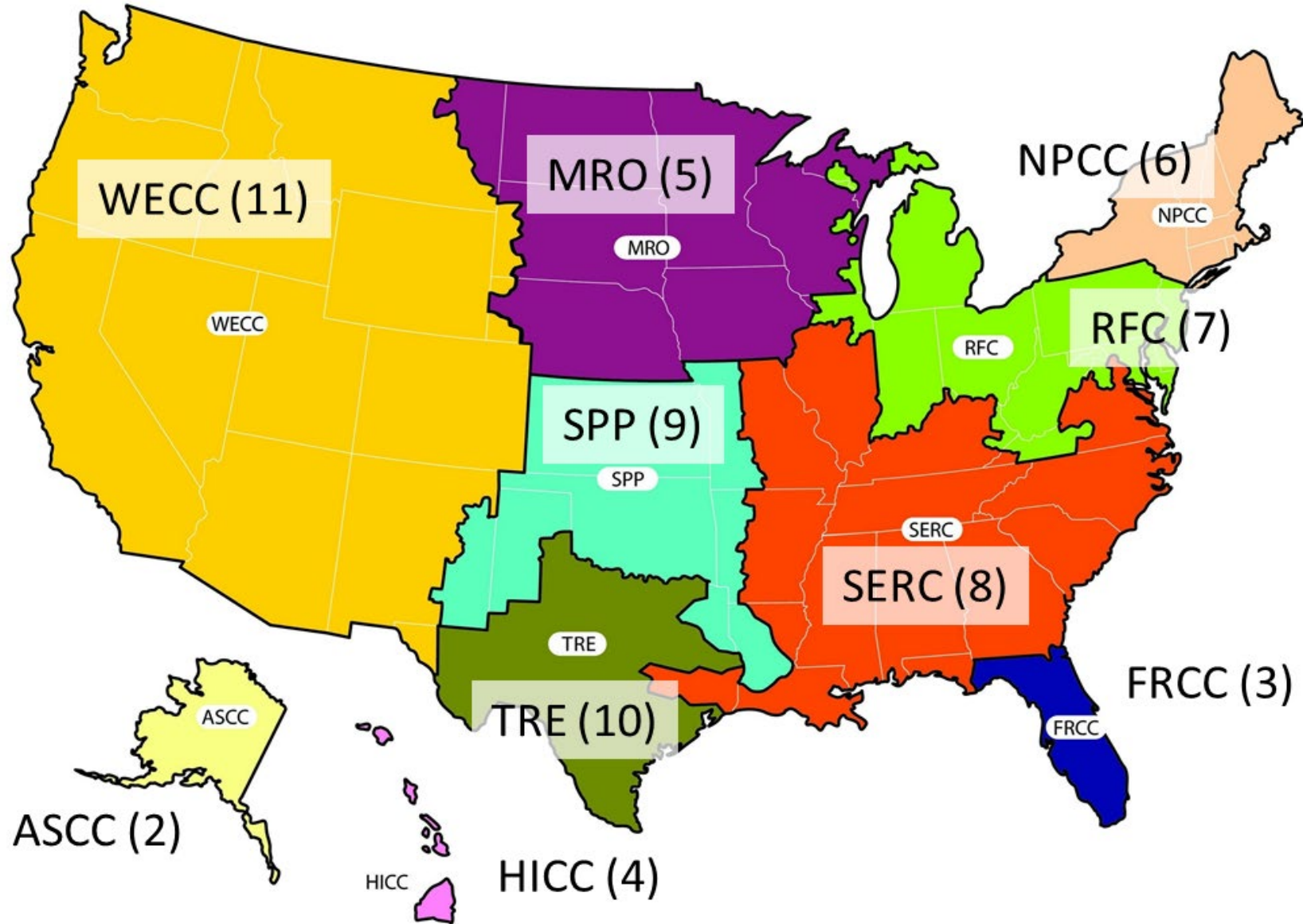
POWER-TO-  
HYDROGEN

## HYDROGEN (WITH SUFFICIENTLY LOW CO<sub>2</sub>E)

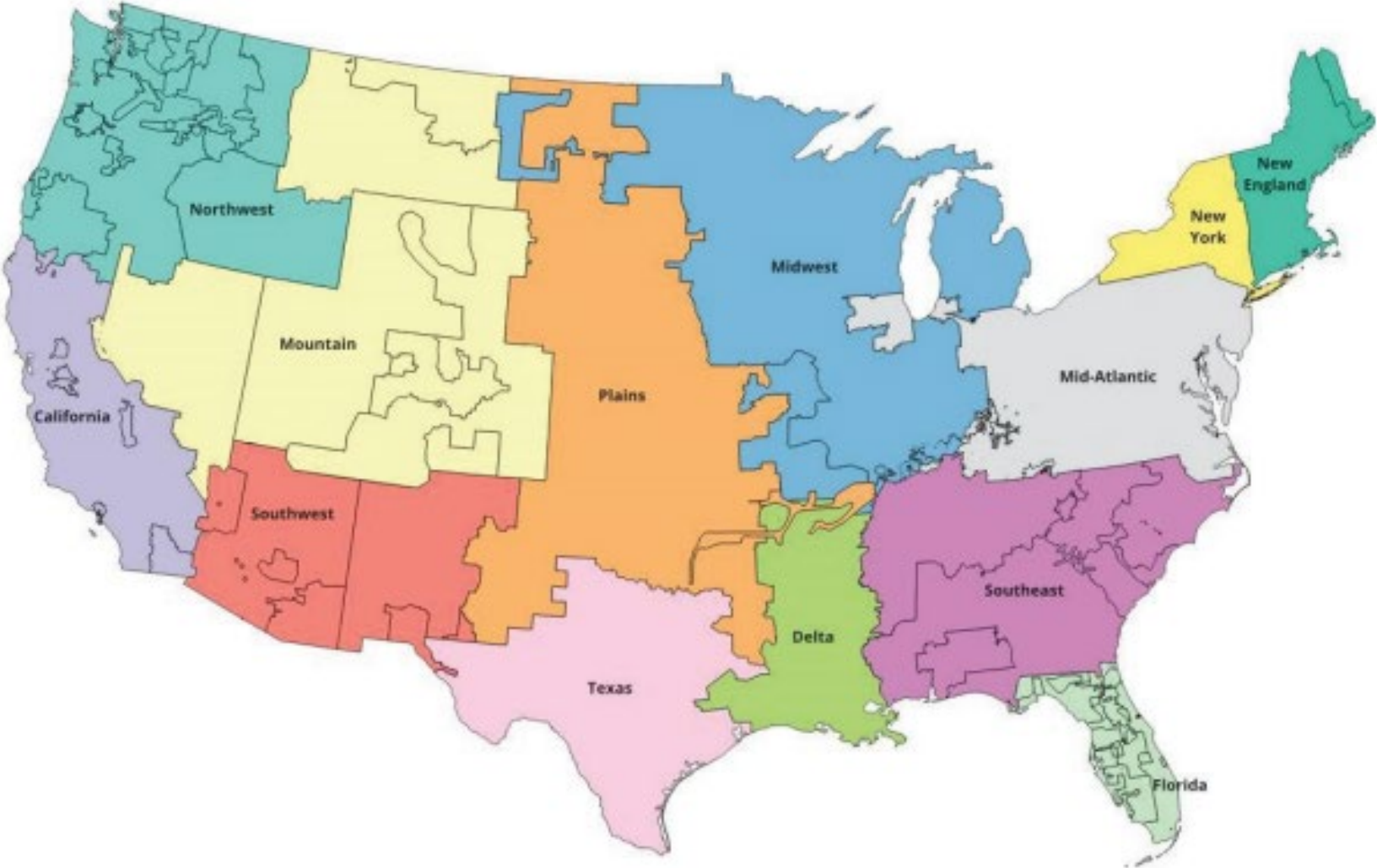
- Baseline: grid emissions
- Energy (electricity) Attribute Certificates
  - Incrementality: Must be from a generation facility that CODs within 36 months prior to H<sub>2</sub> facility PIS date
  - Deliverability: Generation facility must be within same NERC transmission needs study area
- Temporal matching?
  - Hourly default; annual through 2027
  - Uprated production
    - Pro rated to each hour or year
    - What about the 80/20 test?

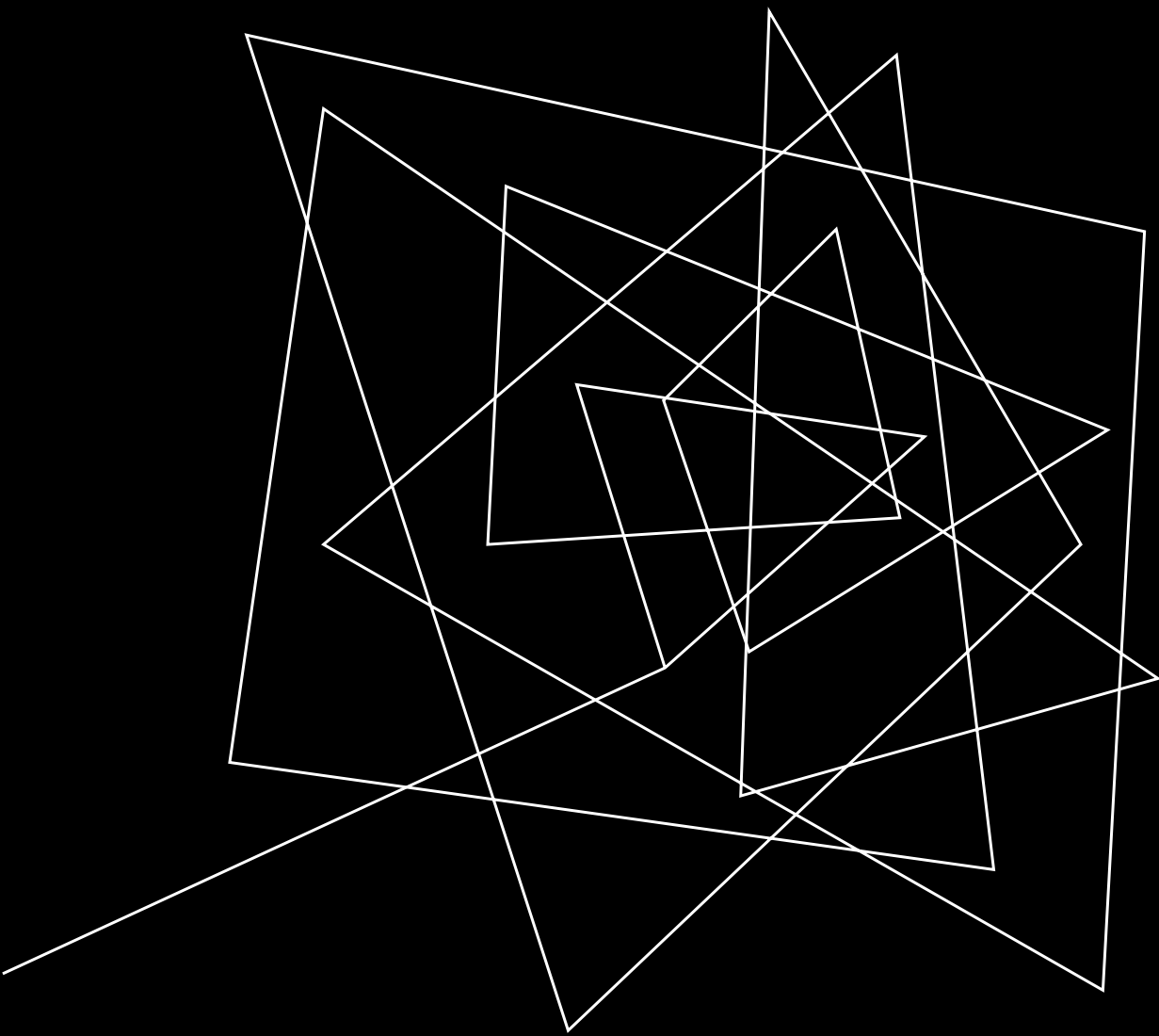


# GRID ELECTRICITY



# EAC AREAS





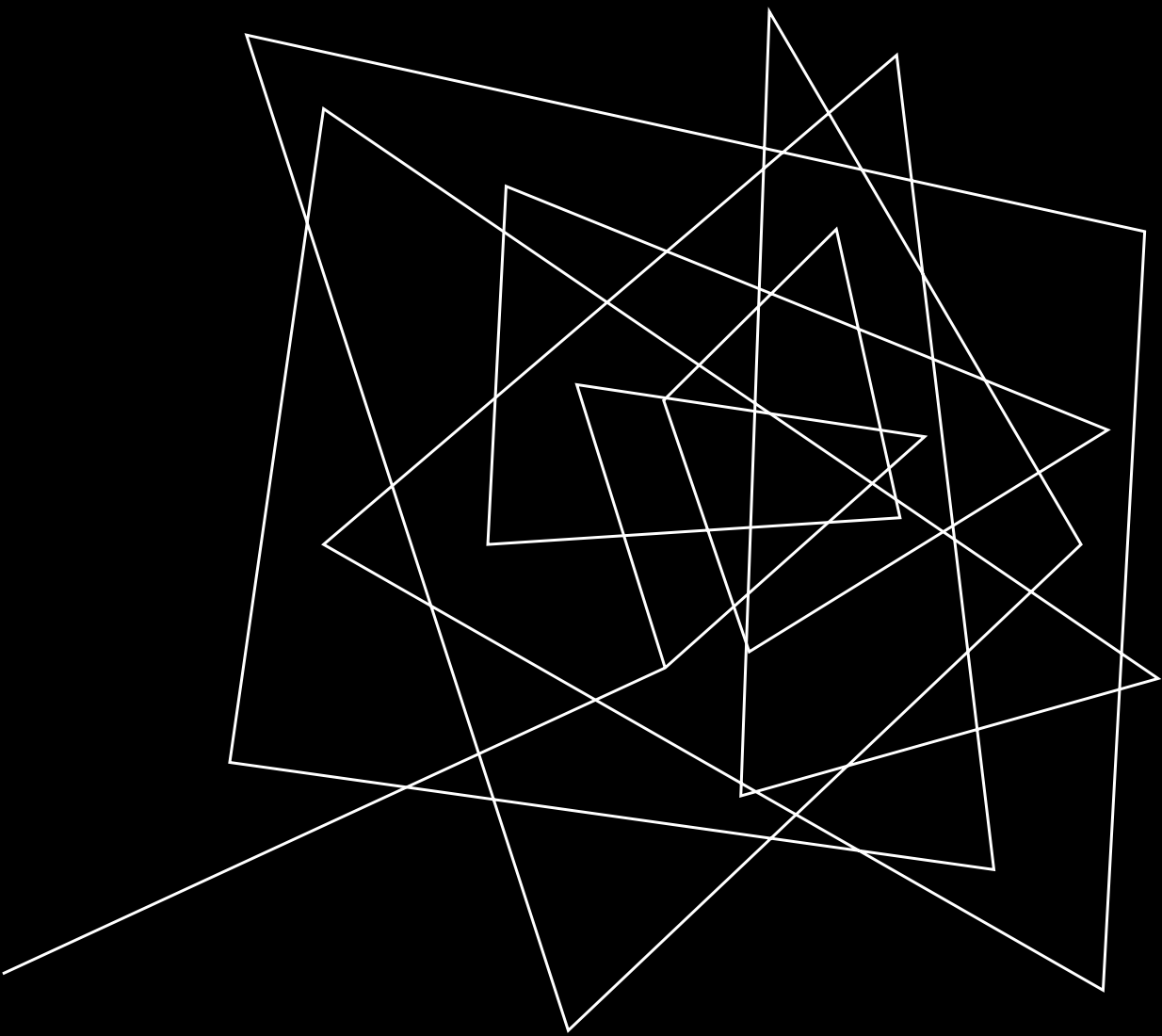
BIOMASS-TO-  
HYDROGEN

## NOT ALL GAS IS FOSSIL GAS

- Hydrogen production at biogenic emissions source
- “Centralized” hydrogen production using methane input
  - Baseline will likely be natural gas emissions
  - RNG will likely be used to improve the score
- Role of carbon capture
  - Cannot claim Code Section 45Q (CCS) on a Code Section 45V (hydrogen) facility
  - Need CCS for production using only fossil gas
  - CCS may not be needed for production that uses sufficient RNG because RNG typically represents avoided emissions

## DIRECT PRODUCTION FROM BIOMASS

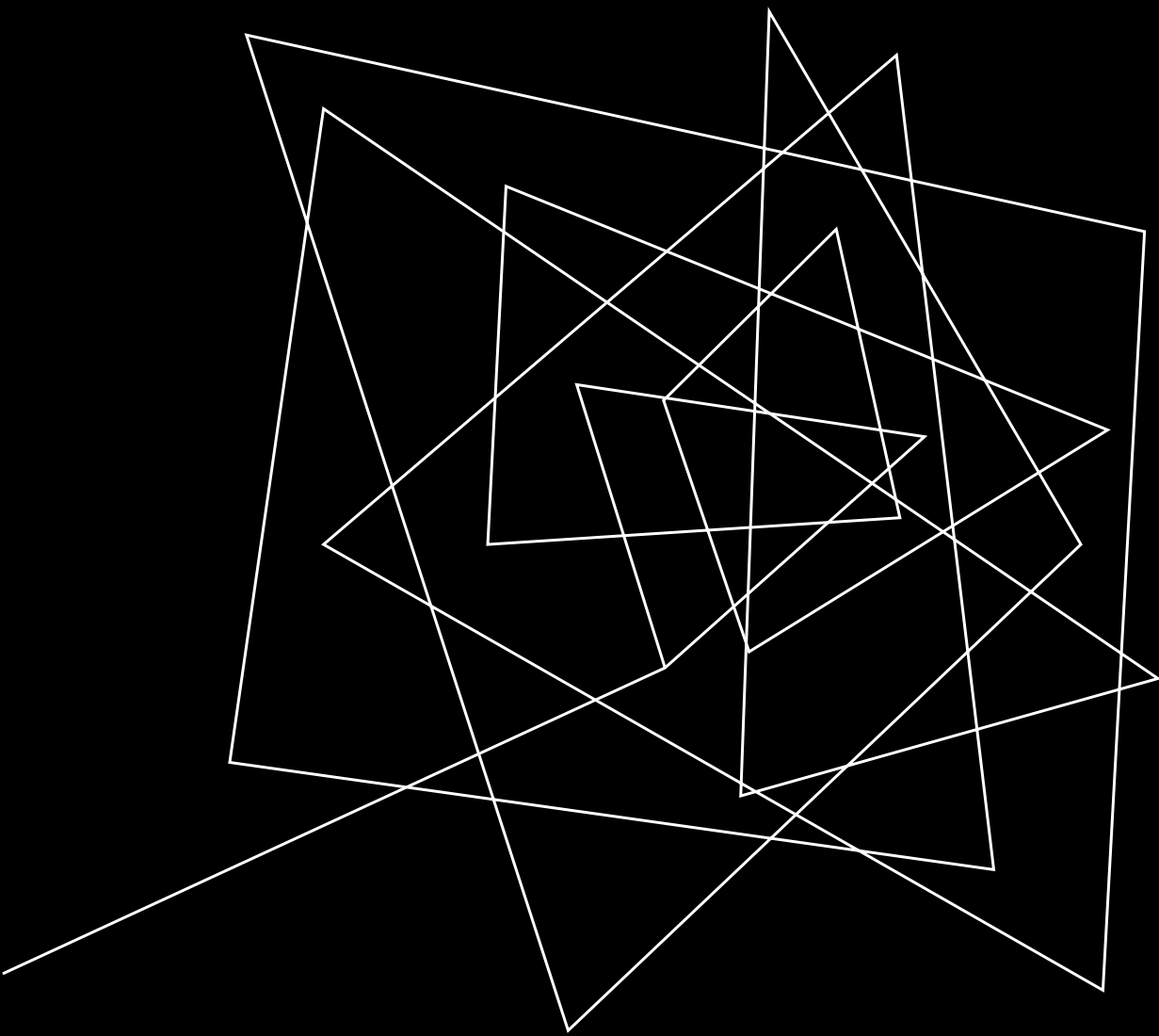
- Hydrogen production using gasification technology
  - Sanctioned inputs: corn stover, forest residue
  - Not yet clear what to do with other potential inputs, e.g., manufacturing waste, diverted organics
- Role of carbon capture
  - CCS not needed for production using sanctioned inputs



MANUFACTURING

# MAKERSPACE

- Demand for U.S. production of equipment varies, in part because of tax credit structure
  - Very strong: Renewable electricity
  - Strong: RNG
  - Weak: Hydrogen
- Trend for onshoring supply chain persists in some sectors
- Section 48C is the only hydrogen manufacturing federal tax credit, and it's not enough



WHAT'S A STATE  
TO DO?



## WHAT ARE YOUR STRONG SUITS?

- Is your state a producer?
  - Renewable electricity generation
  - Water, especially gray water
  - Sanctioned biomass
  - RNG production
    - Wastewater
    - Agricultural operations
    - Urban organics waste handling
  - Skilled labor
- Is your state a user?
  - Heavy transportation, including maritime
  - Steel and other heavy industries
- Is your state both?

## COST V. EFFECTIVENESS

- Fast track permitting for priority activities
- Property, sales, excise tax relief
- Government procurement
- Government landlord
- Income tax incentives
- Strategic investments or debt
- Asset ownership + direct pay



**THIS IS BIGGER THAN  
A MOLECULE.**

Renewable electricity, hydrogen-powered vehicles, carbon-neutral steel, retrofits of gas-fueled boilers/engines, university technology offices, port infrastructure, etc.

## WHAT NOW?

- Get involved with the tax credits
  - Comment on Code Section 45V through February 26, 2024
  - Other final regulations have not been released
    - Direct pay
    - Renewable electricity
  - Work with your Congressional delegations
- Get involved with other federal programs, e.g., loan program office, DOE grants, USDA



# THANK YOU

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