



## Advanced Power Industry

Josh & Kimberly Svaty  
Interim Committee on Energy & Utilities  
November 6, 2023





- **Kimberly Gencur Svaty**
  - Director, Public Policy
- **Joshua Svaty**
  - Senior Advisor, Agriculture & Intergovernmental Relations





- Southwest Power Pool
- ERCOT
- Southeast
- Looking at western expansion

## OUR STATES



ALABAMA



ARKANSAS



GEORGIA



KANSAS



LOUISIANA



MISSISSIPPI



MISSOURI



NEBRASKA



OKLAHOMA



TENNESSEE



TEXAS



Voting member of:

- Markets, Operations, Policy Committee (MOPC)
- Corporate Governance
- Economic Studies Work Group
- Transmission Working Group
- Supply Adequacy Work Group
- REAL Taskforce
- Future Grid Strategic Advisory
- SPP-MISO
- Integration of the Western Market.
- Active in most other SPP Committees plus members are also involved in SPP workgroups and taskforces.



**STEVE GAW**

Senior Vice President  
Infrastructure + Markets



**MAYA NEVELLS**

Transmission Policy Analyst  
Southwest Power Pool



- Energy Storage
- Hydrogen
- Nuclear
- Solar
- Wind
- Transmission



- 2<sup>nd</sup> in the nation for wind energy production as a share of total electric generation
- 47.4% of all electricity comes from clean energy
  - Largely Kansas wind farms
- More than \$16 billion in private capital investment
- 3,800 active wind turbines at 45 wind farms in Kansas
- More than 12,000 direct and indirect jobs
- 12 billion gallons in annual state water consumption savings
- No state general fund dollars have ever been directed to the industry
  - Moved to a voluntary RPS, voluntarily changed tax exemption
- No right of eminent domain for wind, solar, hydrogen or generator lead lines
- Light Mitigation, Tallgrass Heartland, Land Conservation



**Kansas Power**  
ALLIANCE







- Community Solar
- Several 1 MW solar projects
- Johnson City Solar
- Larger-Scale Solar
  - Johnson County
  - Douglas County
  - Sedgwick County





### Attributes of solar power

Likes to be close to load

Peak shaving

Land-banking

Fixed power price

### 3-5 year permitting horizon

Transmission interconnection

Local, state, federal permits

## Quick Facts

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- National Ranking: **46th (43rd in 2022)** .
- State Homes Powered by Solar: **18,164 homes**.
- Percentage of State's Electricity from Solar: **0.28%**.
- Solar Companies in State: **47 (6 Manufacturers, 23 Installers/Developers, 18 Others)**.
- Total Solar Investment in State: **\$258 million**.
- Prices have fallen **43% over the last 10 years**.
- Growth Projection: **1347 MW over the next 5 years (ranks 34th)**.



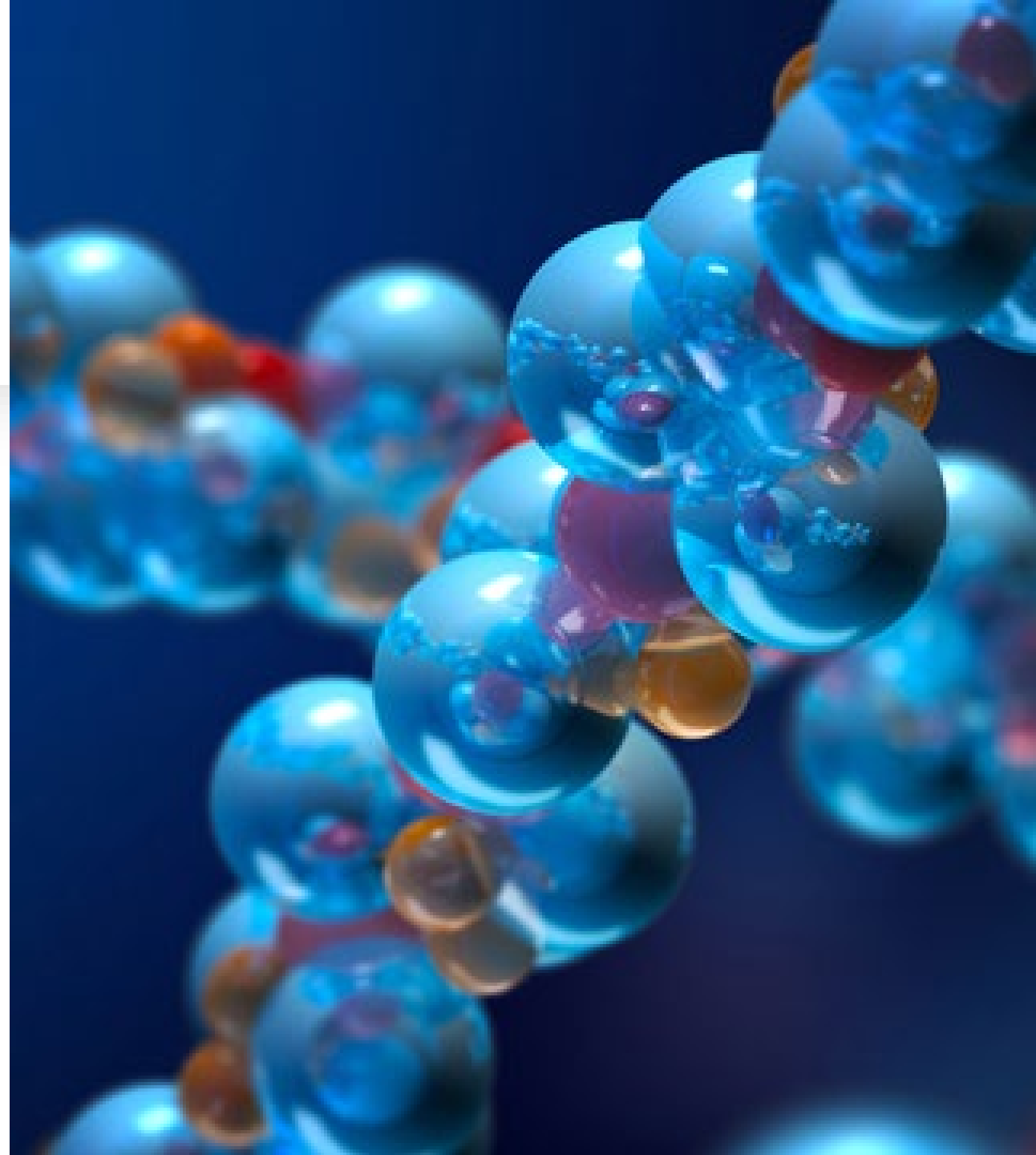
- Utility-scale solar can be paired with energy storage to manage evening energy ramps, provide backup power, and more.
- Of the utility-scale solar contracts signed in 2018, more than 80% of projects were signed under voluntary procurement by a utility or corporate off-taker.
- A utility-scale solar power plant can utilize several solar technologies – primary photovoltaics (PV) or concentrating solar power (CSP).
- Utility-scale solar vs. distributed generation
  - Project size
  - Electricity is sold to wholesale utility buyers, not end-use consumers.
  - Utility-scale solar plants provide the benefit of fixed-priced electricity during peak demand periods when electricity when traditional power is the most expensive.
- Utility-scale solar can include energy storage capacity making it a hybrid project. Storage capacity provides power when the sun is not shining and increases grid reliability and resiliency.
- (Source: [U.S. Solar Market Insight Report](#))





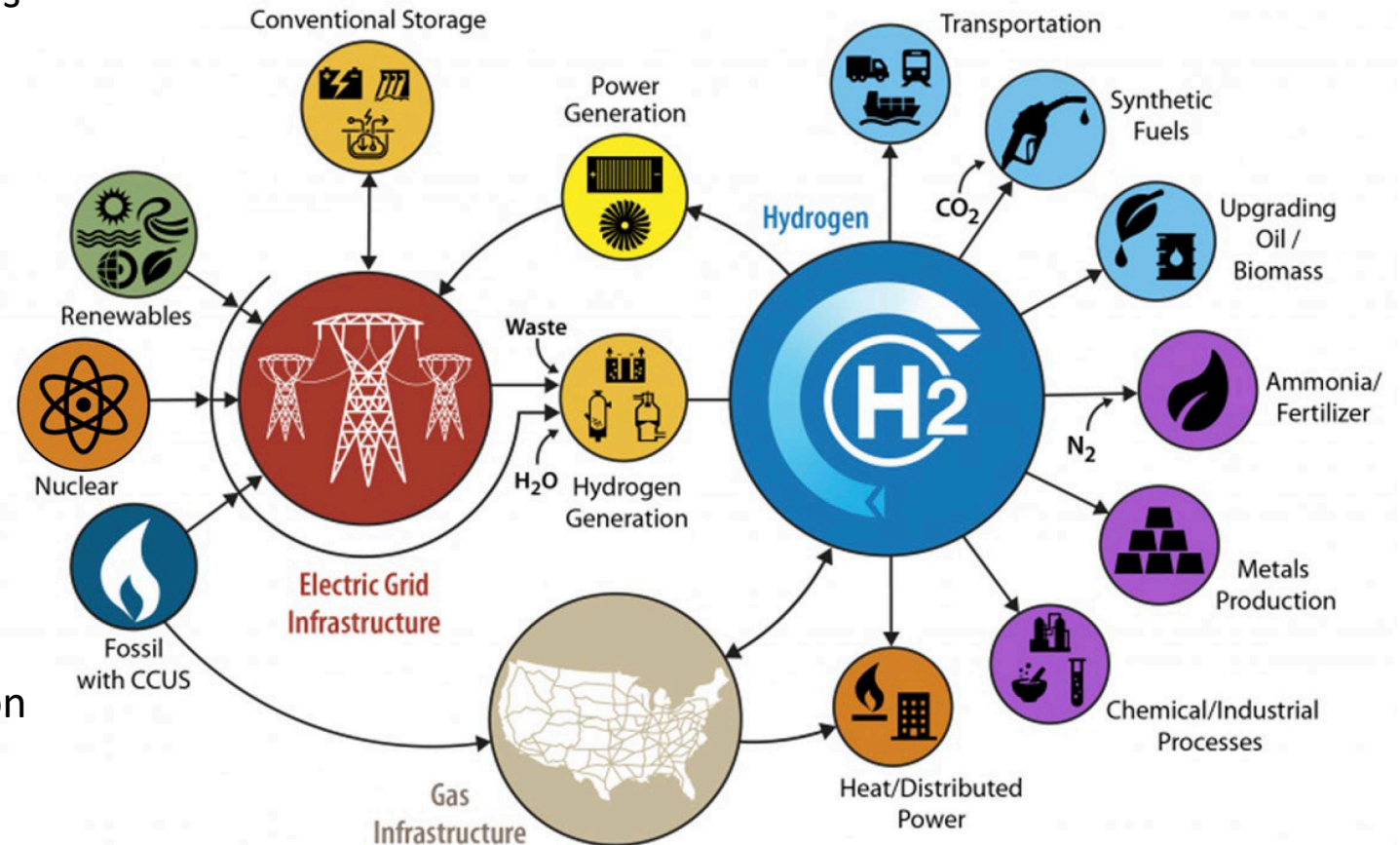
### More Efficient System Use

- Electric Vehicle Charging
- Storage
- Data centers as battery storage
- Hydrogen



# Hydrogen Value Chain in Kansas

- Hydrogen is a flexible molecule with multiple uses
- Hydrogen can be used in
  - Agriculture
  - Power generation
  - Heavy transportation & rail and
  - Other industrial processes
- Lower emissions profile will aid in decarbonization
- Provides a stable, affordable, domestic supply of ammonia & energy



<https://www.energy.gov/eere/fuelcells/h2scale>



# Introduction to HARVEST Hydrogen

HYDROGEN  
AGRICULTURE  
RENEWABLES  
VEHICLES  
ENERGY  
STORAGE  
TRANSPORTATION

H<sub>2</sub>

HARVEST  
HYDROGEN



# U.S. National Clean Hydrogen Strategy and Roadmap

## Strategy



1

**Target strategic, high-impact end uses**

*Achieve 10 MMT/year of clean hydrogen by 2030*



2

**Reduce the cost of clean hydrogen**

*Enable \$2/kg by electrolysis by 2026 and \$1/kg H<sub>2</sub> by 2031*



3

**Focus on regional networks**

*Deploy regional clean hydrogen hubs and ramp up scale*

### Vision:

*Affordable clean hydrogen for a net-zero carbon future and a sustainable, resilient, and equitable economy*

### Benefits:

*Emissions reduction; job growth; energy security and resilience*

Work with other agencies to accelerate market lift off

### Enablers



Good Jobs and Workforce Development



Safety, codes and standards



Policies and incentives



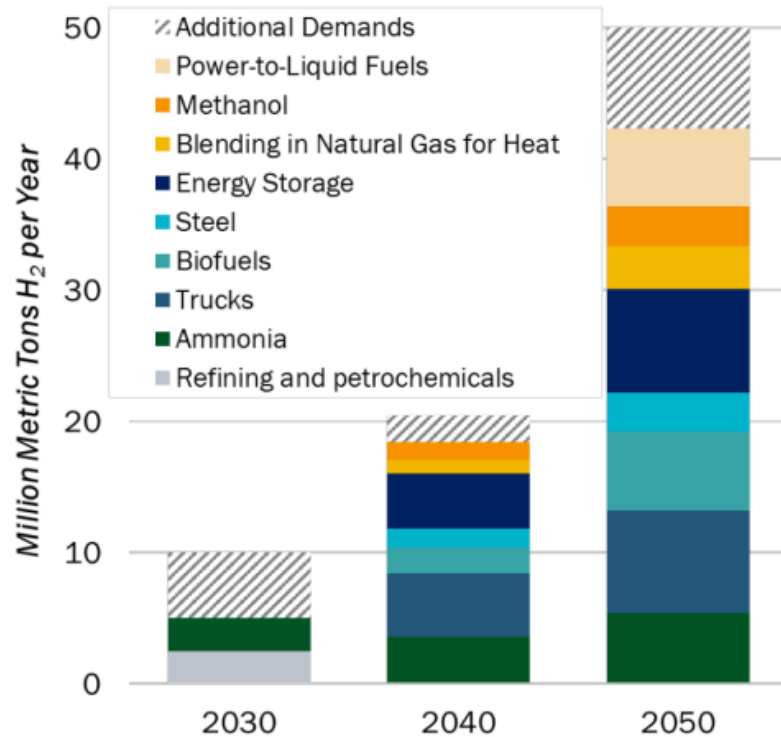
Stimulating private sector investment



Energy and environmental justice

# Strategy 1: Target High-Impact Uses of Hydrogen

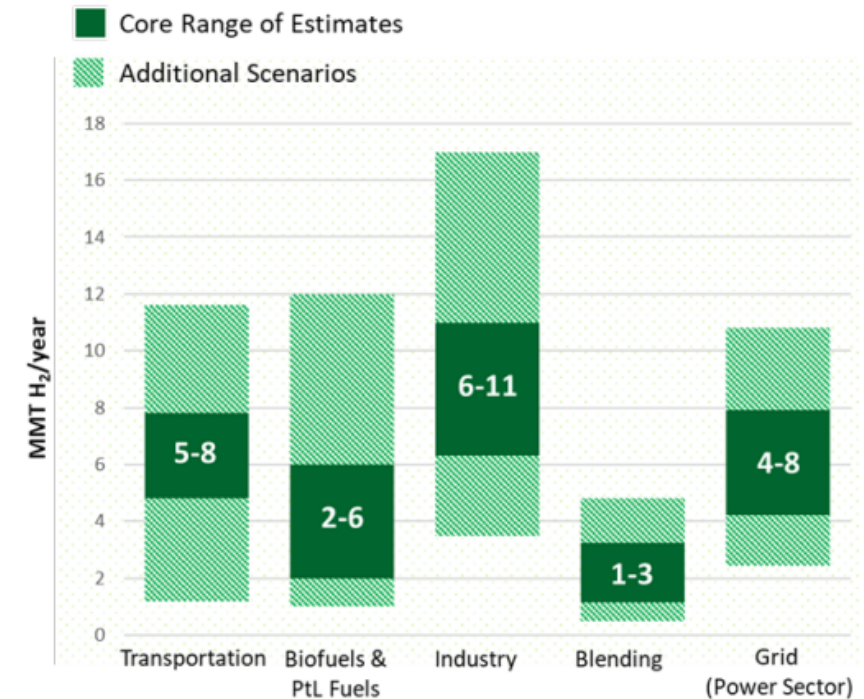
## Opportunities for Clean Hydrogen Across Applications



## Clean Hydrogen Use Scenarios

- Catalyze clean H<sub>2</sub> use in existing industries (ammonia, refineries), initiate new use (e.g., sustainable aviation fuels (SAFs), steel, potential exports)
- Scale up for heavy-duty transport, industry, and energy storage
- Market expansion across sectors for strategic, high-impact uses

## Range of Potential Demand for Clean Hydrogen by 2050



• **Core range:** ~ 18–36 MMT H<sub>2</sub>

• **Higher range:** ~ 36–56 MMT H<sub>2</sub>

**U.S. Opportunity: 10MMT/yr by 2030, 20 MMT/yr by 2040, 50 MMT/yr by 2050. ~10% Emissions Reduction. ~100K Jobs by 2030.**

Refs: 1. NREL MDHD analysis using TEMPO model; 2. Analysis of biofuel pathways from NREL; 3. Synfuels analysis based off H2@Scale; 4. Steel and ammonia demand estimates based off DOE Industrial Decarbonization Roadmap and H2@Scale. Methanol demands based off IRENA and IEA estimates; 5. Preliminary Analysis, NREL 100% Clean Grid Study; 6. DOE Solar Futures Study; 7. Princeton Net Zero America Study

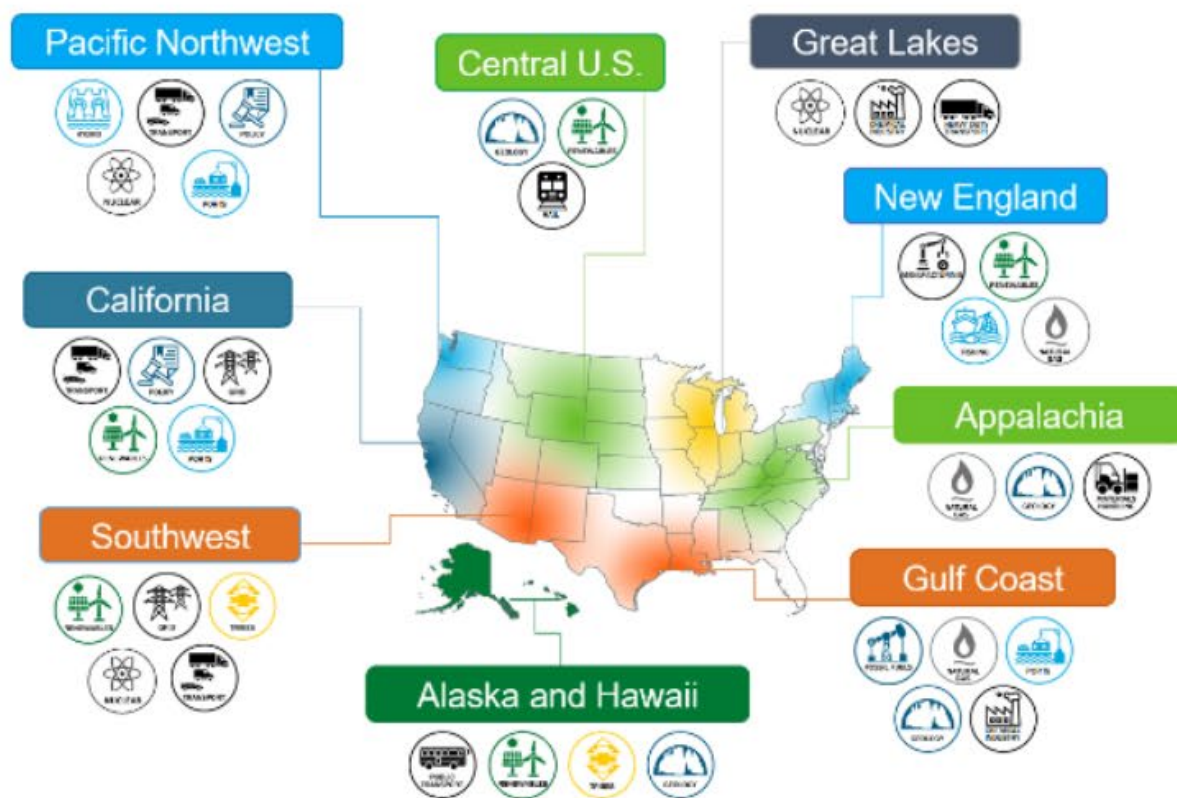


# Strategy 3: Focus on Regional Networks and Ramp Up Scale

## Build Regional Networks through “Clean Hydrogen Hubs”



### Examples of Stakeholder and RFI Input



# Establish a National Network of Hydrogen Hubs

- **U.S. DOE roadmap for a national hydrogen ecosystem**

- \$7B initial federal investment to catalyze development
- Additional \$1B federal investment to accelerate offtake

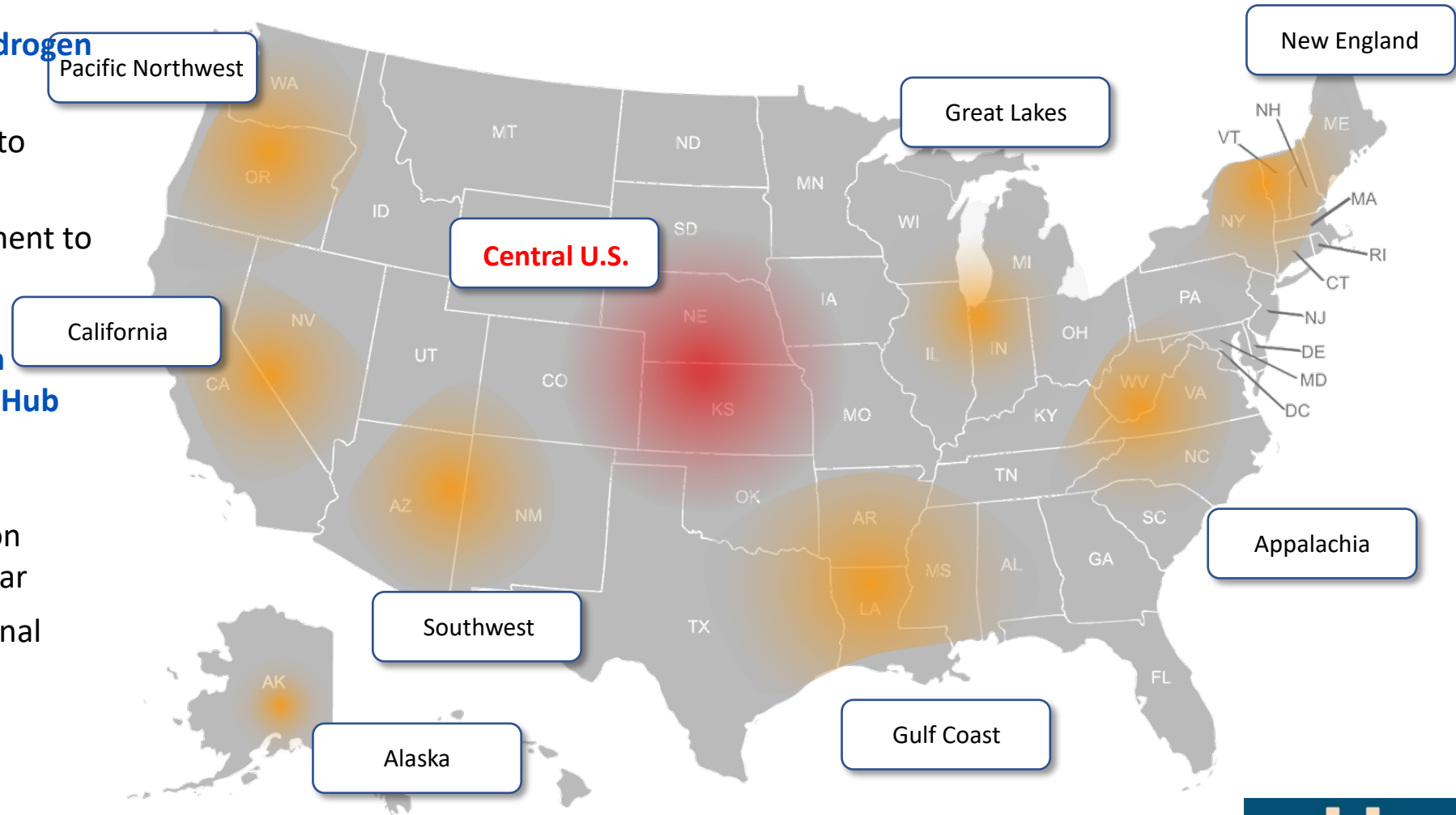
- **Kansas' geographical centrality as an agriculture, transportation, logistics Hub**

- **Kansas Strategic Advantages:**

- Diversified electrical generation portfolio – nuclear, wind & solar
- Salt Deposits – Strategic National Hydrogen Reserve

- **Advantages to Kansans**

- Economic Impact
- Community Benefit
- Ammonia Price & Supply Stabilization



# The HARVEST Proposal

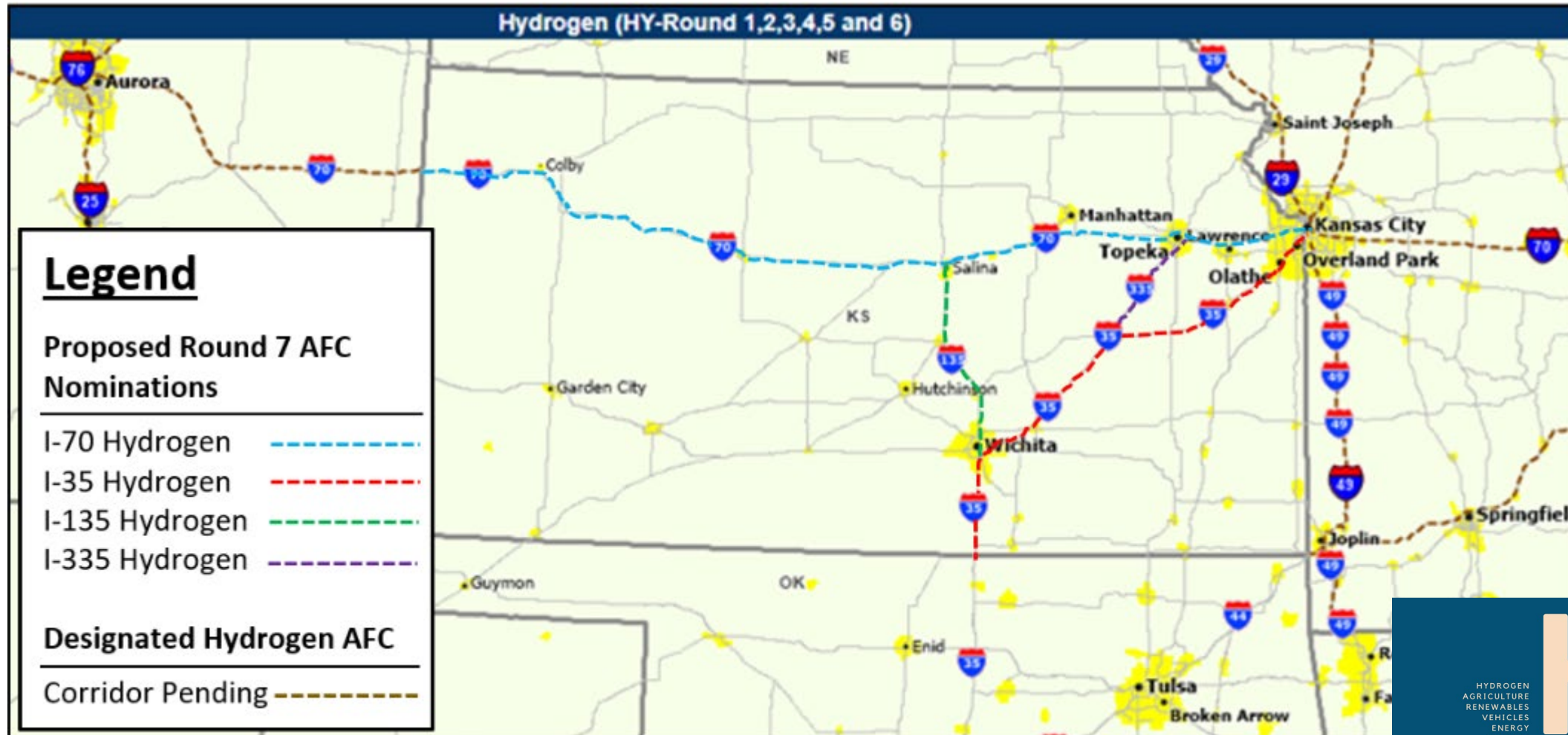


# Team HARVEST

- Budget
  - Other hub proposals
- Work Team
  - KU/ KGS, Kimberly Svaty, Project Partner
- Letters of Support
  - Diverse group
  - Most of the federal delegation
  - Speaker of the House
  - Governor Kelly & Lt. Governor Toland
  - Labor & Trades
  - Community Colleges
  - Board of Regents
  - Economic Development groups
  - Health Foundations
  - Transit Authorities



# US DOT Designated H2 Fueling Corridor





# Hydrogen Hubs by the Numbers

- 79 initial applicants
- 33 were encouraged to advance
  - Including HARVEST Hydrogen
- 22 Made the full application
  - Including HARVEST Hydrogen
- 12-13 Hub proposals were “interviewed”
  - Including HARVEST Hydrogen
- 7 were announced
  - HARVEST Hydrogen was named an alternate
  - 6-9 month “negotiation”
- Four of the seven hubs will produce blue hydrogen (made from natural gas with carbon capture and storage),
- Five will produce green H<sub>2</sub>, (made from renewable energy)
- Two will produce pink hydrogen made from nuclear power
  - Several projects have mixed production methods).
- \$40B direct investment, totaling \$50B in cumulative investment



# Announced Hydrogen Hubs

- **Mid-Atlantic Hub** (Mid-Atlantic Clean Hydrogen Hub MACH2)
  - PA, DE, NJ – up to \$750M
  - 21,000 jobs
  - Produce green and pink hydrogen via electrolyzers, led by the three state governments.
  - 15 “anchor partners”, including industrial gases giant Air Liquide, electrolyser and fuel-cell manufacturer Bloom Energy and power companies PSEG and Chesapeake Utilities.
- **Appalachian Hydrogen Hub** (Appalachian Regional Clean Hydrogen Hub (ARCH2);
  - West Virginia, Ohio, Pennsylvania - up to \$925m.
  - 21,000 jobs
  - Blue hydrogen derived from natural gas with the associated CO<sub>2</sub> emissions captured and permanently stored. It includes hydrogen pipelines and multiple H<sub>2</sub> refuelling stations.

# Announced Hydrogen Hubs

- **California Hydrogen Hub** (Alliance for Renewable Clean Hydrogen Energy Systems (ARCHES));
  - California- Up to \$1.2bn
  - 220,000 jobs
  - Produce green hydrogen from renewables and biomass that will be primarily used to decarbonize public transport, heavy-duty trucking and port operations.
  - There are 203 partners in the project, including Amazon, Bosch, Chevron, GE, General Motors, Hyundai, Microsoft, Michelin, industrial gases giants Air Liquide, Air Products and Linde, hydrogen truck makers Nikola Motors and Hyzon, electrolyser makers Bloom Energy, Plug Power, Thyssenkrupp Nucera, John Cockerill and Hysata, and fuel-cell airplane builders ZeroAvia and Universal Hydrogen.
- **Gulf Coast Hydrogen Hub** (HyVelocity Hydrogen Hub)
  - Texas- Up to \$1.2bn
  - Nation's Energy Core
  - 45,000 jobs
  - Produce both green and blue hydrogen.
  - Seven core partners: oil majors ExxonMobil, Chevron, Orsted; industrial gases giant Air Liquide; power companies AES and Mitsubishi Power Americas; and power and gas networks company Sempra Infrastructure.



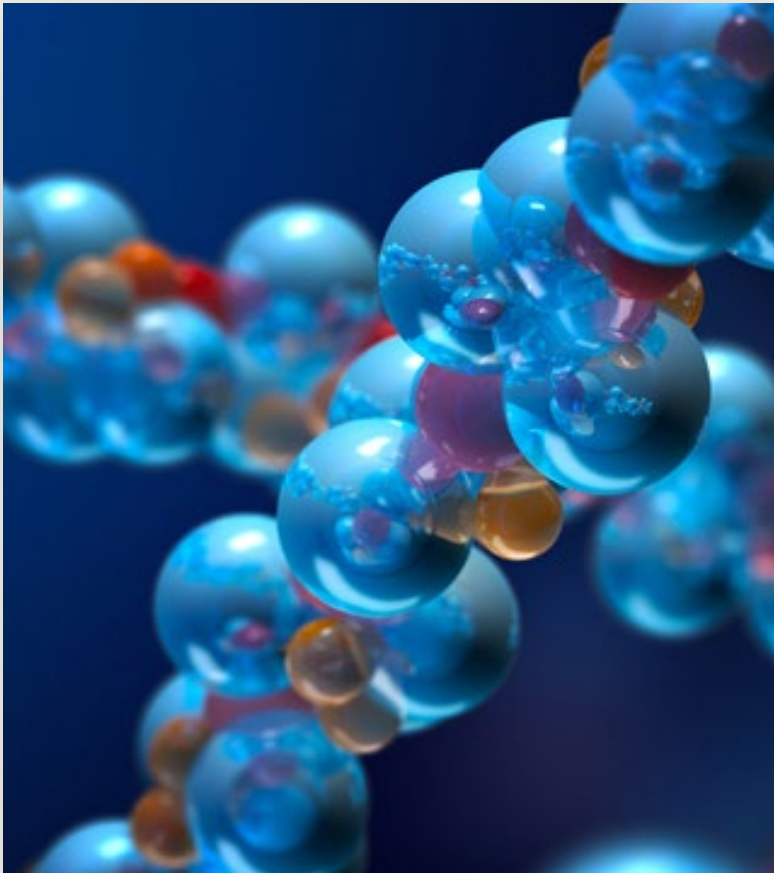




# Announced Hydrogen Hubs

- **Heartland Hydrogen Hub**
  - Minnesota, North Dakota, South Dakota - Up to \$925m
  - 3,880 jobs
  - Blue Hydrogen using natural gas that would otherwise be flared.
  - Xcel Energy; oil refiner Marathon Petroleum; and Canadian energy infrastructure company TC Energy, in collaboration with the University of North Dakota.
- **Midwest Hydrogen Hub** (Midwest Alliance for Clean Hydrogen (MachH2);
  - Illinois, Indiana, Michigan - Up to \$1bn
  - 13,600 jobs
  - This project will produce green, blue and pink hydrogen
  - 71 partners including BP and ExxonMobil, Air Liquide, steel giant ArcelorMittal, fertiliser maker Atlas Agro, Plug Power, Bloom Energy, Nikola Motors, GTI Energy, and Constellation Energy
- **Pacific Northwest Hydrogen Hub** (PNW H2)
  - Washington, Oregon, Montana - Up to \$1bn
  - 10,000 jobs
  - Green hydrogen effort that includes proposed projects from 17 companies, including Amazon, Air Liquide, Australian renewable H<sub>2</sub> developer Fortescue, Mitsubishi Power Americas, Atlas Agro, and local utilities Puget Sound Energy and Portland General Electric, which source most of their power from hydroelectric dams.
  - Fortescue says that the hub includes its proposed facility in Centralia, Washington state, which will “produce green hydrogen at scale for use locally in the Pacific Northwest in heavy-duty transportation, grid reliability, maritime, industrial processes, and other hard-to-abate sectors”.

# DOE H2 Programs



- \$1 billion for a Clean Hydrogen Electrolysis Program: Electrolysis (using electricity to split water into hydrogen and oxygen) allows for clean hydrogen production from carbon pollution-free power sources like wind, solar, and nuclear. This program will improve the efficiency and cost-effectiveness of these technologies by supporting the entire innovation chain—from research, development, and demonstration to commercialization and deployment.

- \$500 million for Clean Hydrogen Manufacturing and Recycling RD&D Activities: DOE will also support American manufacturing of clean hydrogen equipment, including projects that improve efficiency and cost-effectiveness and support domestic supply chains for key components, through the Bipartisan Infrastructure Law’s Clean Hydrogen Manufacturing Initiative. DOE has also announced funding, as part of the Clean Hydrogen Technology Recycling Research, Development, and Demonstration Program, for innovative approaches to increase the reuse and recycling of clean hydrogen technologies.

- In March 2023, DOE announced the first phase of funding for the Clean Hydrogen Electrolysis Program and the BIL’s manufacturing and recycling initiatives with a \$750 million funding opportunity to dramatically reduce the cost of electrolyzers and other clean-hydrogen technologies. Even

# What's Next?

- Same core tenants underlying HARVEST's application stand
- The hydrogen economy is coming to Kansas
- Jericho Energy Ventures announcement with Superior Boiler in Hutchinson for alternative fuel boilers
- Industrial uses and offtake
  - Aviation
  - Cement
  - Steel manufacturing
  - Refineries
- Agricultural uses and offtake – domestic, homegrown supply
- Transportation
- Storage
- Pipeline infrastructure



# DOT Rulemaking Initiatives

## Rupture Detection and Valve Final Rule Published 4/8/2022

- Improve the timeliness of rupture identification, response, and mitigation of safety, greenhouse gas, and environmental justice impacts.
- Establishes requirements for rupture-mitigation valve spacing, maintenance and inspection, and risk analysis.
- Requires operators to identify ruptures and close valves to isolate the ruptured segment as soon as practicable, not to exceed 30 minutes from rupture identification.



## Leak Detection and Repair Notice of Proposed Rule 5/18/2023

- Applies to nearly 3 million miles of pipelines; all underground natural gas storage, and LNG facilities.
- Reduce intentional and unintentional emissions from new and existing pipelines
- Requires operator to provide for the timely identification and repair of all leaks.



# Hydrogen Research

## Technology Development

Solutions for Predicting /  
Monitoring Hydrogen Gas Loss

## General Knowledge

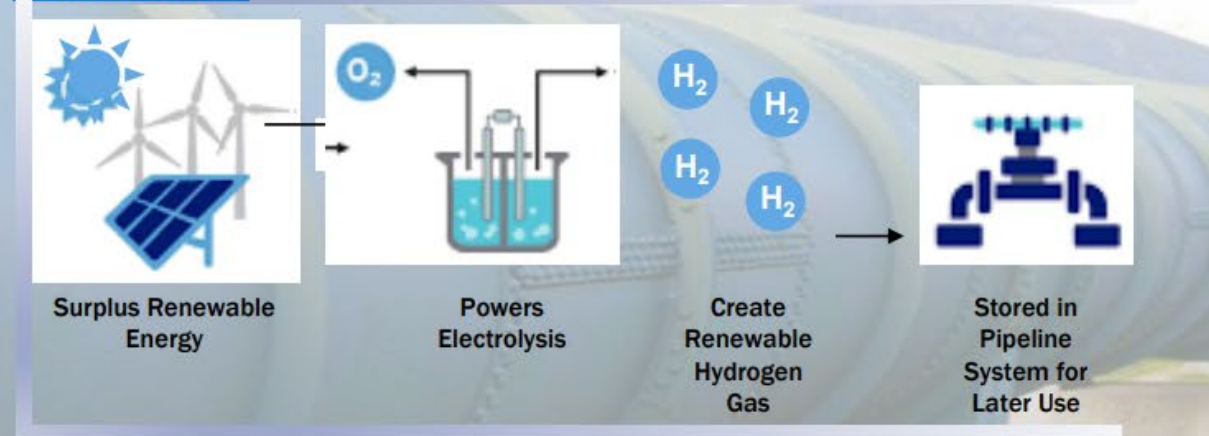
Review of Integrity Threat  
Characterization Resulting from  
Hydrogen Gas Pipeline Service

## Technology Development

Advancing Hydrogen Gas Leak  
Detection Tools when Blended with  
Natural Gas Pipeline Operations

## General Knowledge

Determining Requirements for  
Repurposing Existing Pipelines to  
Transport Blended & Pure Hydrogen



## Technology Development

Validate Existing or Develop New Hydrogen  
Leak Detection Sensors Compatible with  
Hydrogen-Natural Gas Blends



Questions?

