

# HFTO H<sub>2</sub> Infrastructure Technologies Subprogram Overview

**Ned Stetson, HFTO – H<sub>2</sub> Infrastructure Technologies Program Manager**

2024 Annual Merit Review and Peer Evaluation Meeting

May 7, 2024 – Arlington, VA



# The Hydrogen Infrastructure Technologies Team

## Program Manager



Ned  
Stetson



Mark  
Richards



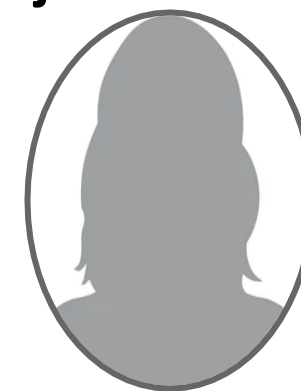
Marika  
Wieliczko



Zeric  
Hulvey



Kevin  
Carey



New  
TM/TPO



New  
TM/TPO

## ORISE Fellows



Asha-Dee  
Celestine



Zakaria  
Hsain

## Lab Detailee



Abhi  
Karkamkar



Josh  
Farley

## Support Contractors



Nikkia  
McDonald

Haboon  
Osmond

# H<sub>2</sub> Infrastructure Technologies Program: Collaboration Network

Fostering technical excellence, economic growth and environmental justice

## Efforts Support Over:

13 national laboratories

19 universities

15 companies

## DOE H<sub>2</sub> Program Collaborations

VTO	AMMTO	BETO
SETO	IEDO	ARPA-E
SC	FECM	NE

## DOE Cross-Cutting Initiatives

Hydrogen Joint Strategy Team	Industrial Decarbonization	Long Duration Energy Storage
Clean Energy Manufacturing	Clean Fuels & Products	Carbon Negative
Critical Minerals & Materials	Industrial Heat	AI/ML

## Cross-Agency Collaborations

H <sub>2</sub> IT	DOC-NIST	DOC-NOAA	NASA	DOD	DOT
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## Regional and International Collaborations

IEA H <sub>2</sub> TCP	ISO TC197 US TAG	Bilateral Collaborations
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## Industry Engagements

21<sup>st</sup> Century Truck Partnership

U.S. DRIVE

HyMARC

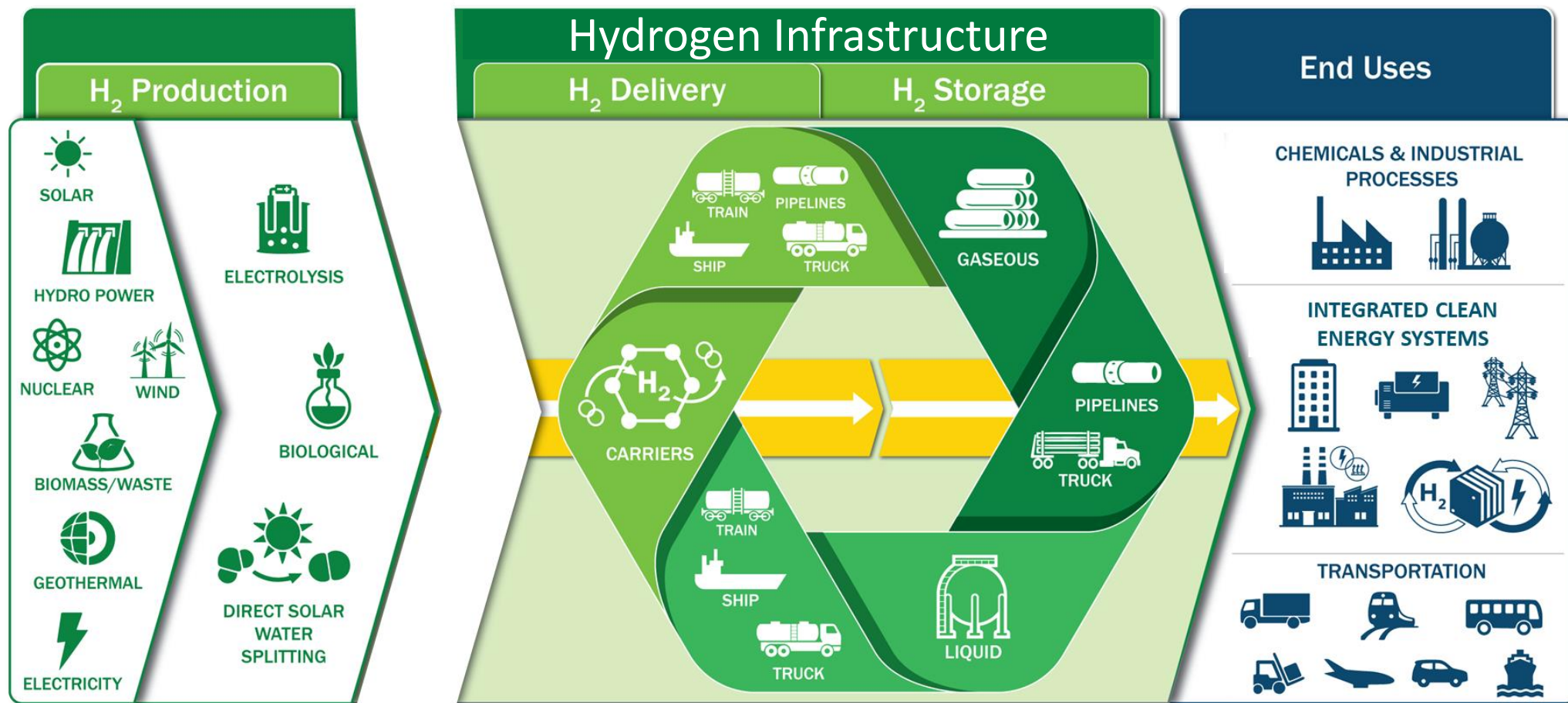
H-MAT

HyBlend

Workshops/RFIs

# Hydrogen Infrastructure Technologies

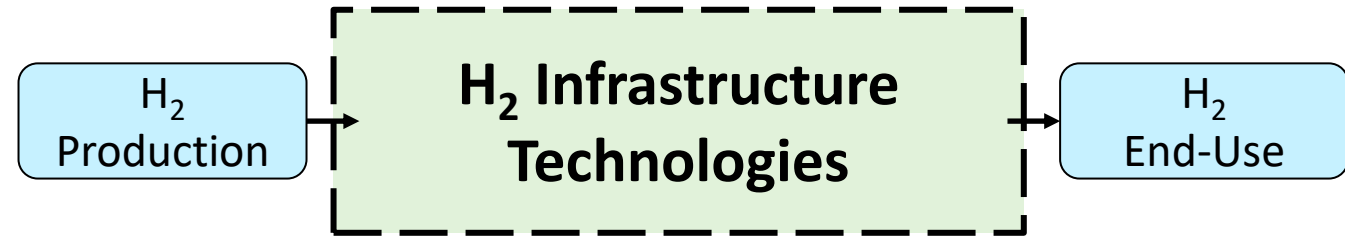
**Mission: To carryout RD&D activities to develop H<sub>2</sub> infrastructure technologies to enable achieving the National Hydrogen Strategy and decarbonization goals**



*From producing hydrogen molecules through dispensing to end-use applications*

# What are H<sub>2</sub> Infrastructure Technologies?

Everything needed to get the produced H<sub>2</sub> molecule to the end-use application



- Hydrogen within the infrastructure may be as a gas, cryogenic liquid, or materials-based carrier
- May include any of the following:
  - **H<sub>2</sub> Conditioning:** compression, liquefaction/vaporization, H<sub>2</sub> carrier hydrogenation/dehydrogenation, purification, temperature control
  - **H<sub>2</sub> Transmission/Distribution:** on-road (e.g., tube/tanker trailers), pipelines, rail, marine, bulk buffer storage, transfers, sensors/monitoring
  - **H<sub>2</sub> Dispensing:** dispensers, metering, nozzles/receptacles, hoses, breakaways, temperature control, sensors/monitoring, cascade storage, compressors, pumps
  - **End-Use Storage:** on-site, on-vehicle storage

All infrastructure steps may occur on a single property (e.g., onsite production/use for energy storage or large-scale industry), or could spread across multiple continents (e.g., international export)

Overarching metric is the cost of H<sub>2</sub> to the end-user, i.e., cost of production + total cost of delivery and dispensing

# To Meet Decarbonization Goals – Focused on Three Sectors

- Medium & Heavy-Duty Transportation
- Chemical & Industrial Processes
- Energy Storage

## - Developing Scenarios for Each

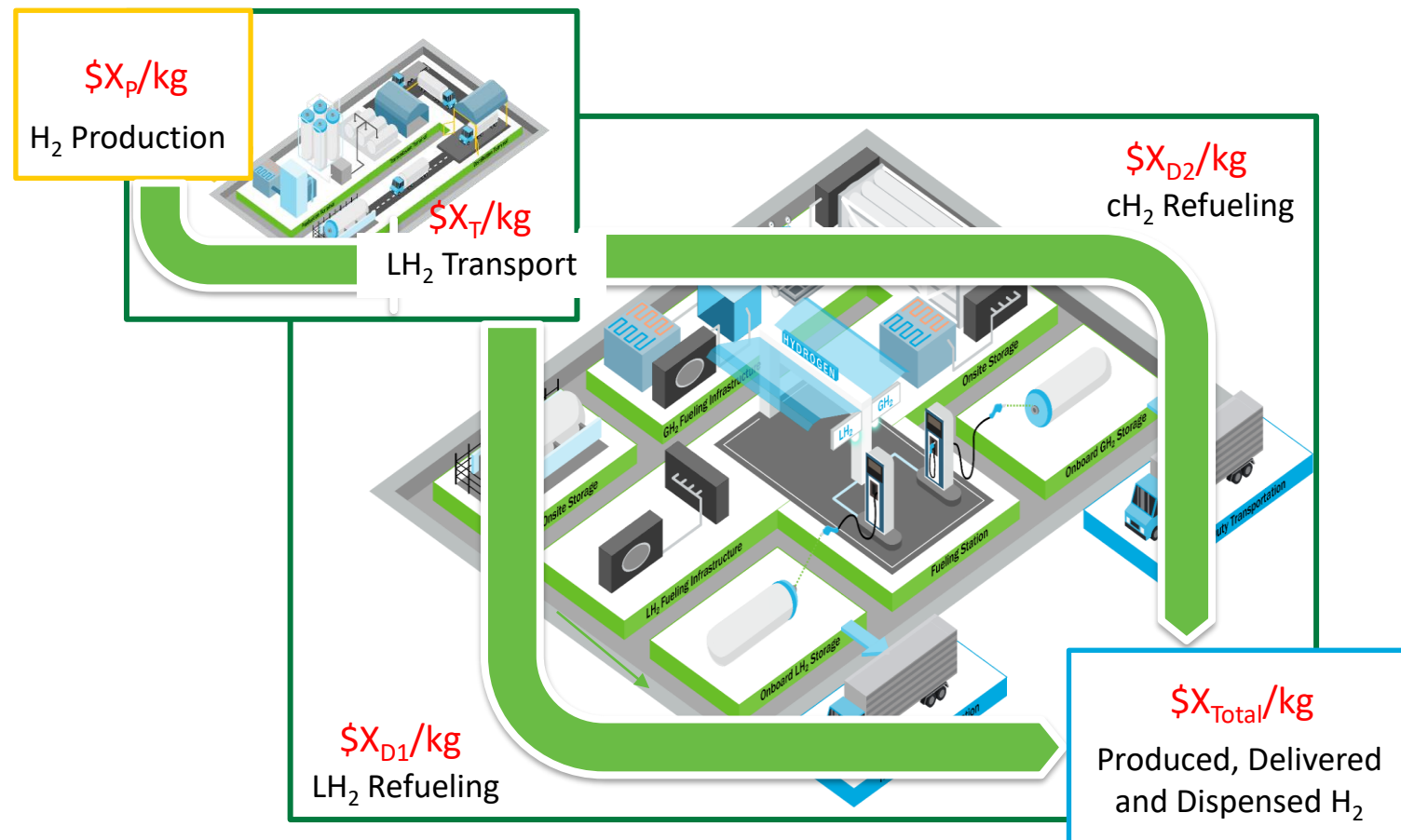
### Example: MD/HD Refueling

Assume LH<sub>2</sub> delivery to stations in near-term

Need to consider both cH<sub>2</sub> and LH<sub>2</sub> onboard storage

#### Strategic Focus Areas

- Analysis
- Materials
- Liquefaction
- Cryopumps
- Compression
- Storage



# HFTO Infrastructure Workshops

## 1/17-18/24: Denver, CO

- **Covered MD/HD transportation, industrial/chemical, and energy storage sectors**
- ~160 attendees (in-person and virtual)
- Breakout sessions
  - MD/HD transportation
    - Vehicle requirements
    - End-use/fleet
    - Hydrogen supply and delivery
    - Fueling station dispensing
  - Industrial/chemical
  - Energy storage
    - Small/mid-scale
    - Large scale

## 2/27-28/24: Alexandria, VA

- **Focus on MD/HD transportation sector**
- ~80 attendees (in-person only)
- Discussions focused R&D needs, priorities, and performance metrics within the MD/HD transportation space
- Initial breakouts for onboard and offboard discussions
- Further discussions centered on three areas
  - Needs for testing and validation facilities: especially cryogenic components
  - Boil-off management: sources, capture approaches, and monitoring
  - Cryogenic infrastructure: capabilities, gaps, and performance needs/metrics

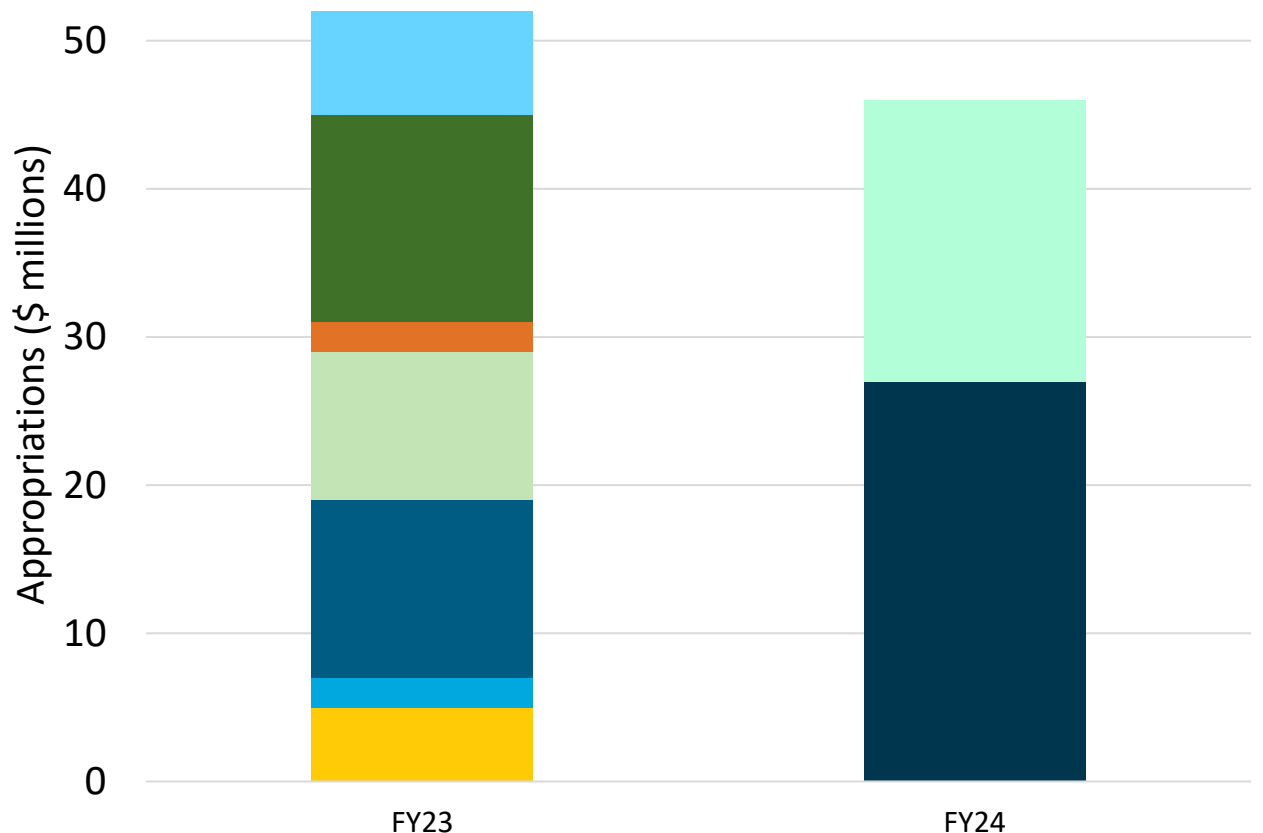
# Key Stakeholder Input at the MD/HD Transportation Sector Workshop

- Liquid supply and dispensing offer the lowest cost station option, if boil-off is well managed
- Onboard cryogenic hydrogen storage of interest for higher density
- Deployment targeting: Class 8 long-haul & regional trucks, city buses, and Class 5 service trucks
- Need for redundancy and high-reliability
- Mobile refuelers can help accelerate deployment
- ***Three RD&D areas identified for priority DOE investment:***
  - 1. Testing and validation facilities***
  - 2. Boil-off management***
  - 3. Cryogenic infrastructure***

# H<sub>2</sub> Infrastructure Technologies Appropriations

**FY23 Appropriations  
\$52 million**

**FY24 Appropriations  
\$46 million**



## Program Direction

### H<sub>2</sub> Infrastructure Focus Areas for FY24

- High-throughput fueling components (FOA)
- H<sub>2</sub> Carrier demonstrations for non-vehicle apps (Lab Call)
- Bulk sub-surface storage (NREL)
- Materials-compatibility for H<sub>2</sub> service (H-Mat)
- Blending of H<sub>2</sub> with natural gas (HyBlend)
- H<sub>2</sub> storage & carrier materials (HyMARC)
- Low-cost carbon fiber for advanced tanks (ORNL)
- Analysis and cross-cuts (various)

**FY25 Request  
\$52 million**

*\*Core budget complements BIL funding*

# FOA Topics for H<sub>2</sub> Infrastructure Technologies Activities

- **FY23 HFTO FOA**

- Hydrogen Carrier Development – 7 new awards

Institution	Project Title
Colorado School of Mines	<i>Scalable, Low-cost Hydrogen Delivery Systems</i>
Louisiana State University	<i>Enabling formate-based hydrogen storage and generation via multimetallic alloy catalysts</i>
Rice University	<i>Plasmonic Photocatalysis for LOHC-Based Hydrogen on Demand</i>
Univ. of Southern California	<i>Chemical Hydrogen Storage Media with Value-Added Co-Products</i>
Univ. of Tennessee Knoxville	<i>Highly Active Hexagonal Boron Nitride Catalysts for the Dehydrogenation of Liquid Organic Hydrogen Carriers</i>
John Hopkins University	<i>Efficient Ammonia Decomposition Using PGM-Free High-Entropy Alloy Catalysts</i>
Washington State Univ.	<i>Developing a New Liquid Organic Hydrogen Carrier (LOHC) Technology for Hydrogen Storage in the Sustainable Aviation Fuels (SAFs)-Lignin Jet Fuel (LJF)</i>

- Onboard Storage Systems for Liquid Hydrogen – 3 new awards

Institution	Project Title
GE Research	<i>Composite LH2 Tank for Heavy Duty Trucks and H2 Aircraft</i>
Raytheon Tech Research Center	<i>Conformable, Composite Tank for Liquid Hydrogen Storage in Heavy-duty Ground Transportation</i>
Komatsu America Corp.	<i>High-Capacity Onboard Storage System for Off Road Mining and Construction Vehicles</i>

# FOA Topics for H<sub>2</sub> Infrastructure Technologies Activities

- **FY23 HFTO FOA (continued)**

- Liquid Hydrogen Fueling/Transfer Components and Systems – 3 new awards

Institution	Project Title
GTI Energy	<i>Mobile Sub-Cooled Liquid Hydrogen Fueling Station</i>
Colorado School of Mines	<i>Solid State Based Hydrogen Loss Recovery During LH2 Transfer</i>
Linde Engineering North America, LLC	<i>High Rate LH2 Fueling for HD Rail</i>

- **FY24 HFTO FOA**

- Topic 1: Components for Hydrogen Fueling of Medium- and Heavy-Duty Vehicles

- **FY24 Lab Call**

- Topic 1: Industry Partnerships for Demonstration of Materials-based Hydrogen Carriers

# FOA Topics for H<sub>2</sub> Infrastructure Technologies Activities

- **FY23 H<sub>2</sub> Infrastructure Technologies SBIR/STTR Phase I Awards – 6 new awards**

## Hydrogen and Fuel Cell Technologies Office FY2023 SBIR-STTR Phase I Awards

### C56-18c Fast Response Flow Control Valves for Gaseous Hydrogen Fueling of Fuel Cell Vehicles

Kalsi Engineering, Inc.	Development of fast response flow control valve for gaseous hydrogen fueling of fuel cell vehicles
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### C56-18d Hydrogen Leak Quantification Technologies for Environmental Monitoring (coordinated with SCS)

Aerodyne Research, Inc.	Low-Cost Hydrogen Monitor for Continuous Quantification of Facility Emissions
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Solve Technology and Research, Inc.	Multi-Gap Fabry Perot Fiber Optic Sensor for Real-Time and Cumulative Leak Detection and Quantification
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### C56-18g Liquid Hydrogen Fueling and Delivery Components

Eta Space	Low Loss LH2 Servicing System for Heavy Duty Vehicle Fueling
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Kepner Products Company	Liquid Hydrogen Fueling and Delivery Components
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Tech4Imaging LLC	Two-Phase Hydrogen Mass Flow Meter for Fuel Transfer in Ground Based Infrastructure
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- **FY24 H<sub>2</sub> Infrastructure Technologies SBIR/STTR Phase I Topics**

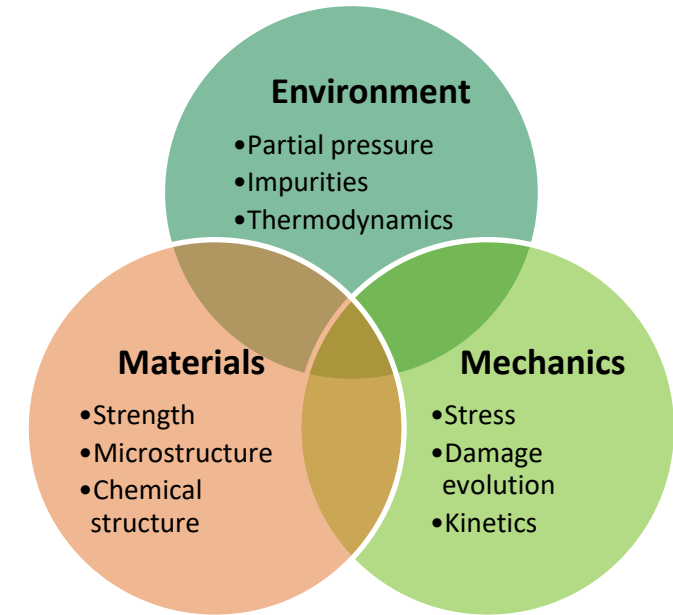
- Novel Materials for Use in Liquid Hydrogen Service
- Novel Concepts for Hydrogen Infrastructure and Storage

# Example Supported Project Activities: Consortia

## H-Mat Consortium conducts cross-cutting R&D on hydrogen effects on polymers and metals

Explore hydrogen/material interaction interactions to inform science-based strategies for material design to improve resistance to hydrogen degradation

- Integrate innovative computational and experimental activities to inform mechanistic understanding at nm-length scales
- Employ model systems to describe materials performance in high-pressure hydrogen environments
- Build scientific framework across length scales to engineer hydrogen compatibility performance at the component scale



### • Collaborations

- Pre-competitive data sharing through databases at <https://h-mat.org>
- MOU with Kyushu University signed in 2022

### • Recent activities include:

- Generate “master curves” to inform pipeline codes and standards and accelerate adoption of new materials
- Reduce expansion of seals in hydrogen by 50%
- Enhance life of vessels by 50% through improved understanding of crack nucleation



Compressor Components and Seals



Pipelines



Storage Vessels



Dispensing Hoses

IN001a&b

# Hydrogen Blending in Natural Gas Pipelines

## Reducing the Carbon Intensity of the Natural Gas Grid via Hydrogen Blends

### Phase I

#### Two-year, \$15MM CRADA Project

- 4 National Labs + 31 partners from industry & academia
- Objectives:
  - Pipeline materials compatibility R&D
  - Techno-economic and life-cycle analysis

### Phase II

#### Three-year, \$TBD CRADA Project

- 4 National Labs + ~40-50 partners from industry & academia
- Lab expertise, generated data and reports, monthly meetings
- Contact: [Hyblend\\_CRADA@nrel.gov](mailto:Hyblend_CRADA@nrel.gov)

### Key Findings and Outputs

#### Metals R&D



Providing scientific bases and probabilistic tools for structural integrity assessment of H<sub>2</sub> pipelines (HELPR software release date: Q1 2024)

#### Polymer R&D



Blended gases affect the semicrystalline morphology of high-density polyethylene (HDPE), impacting toughness / pipe stability on polymer chemistry

#### Life-Cycle Analysis

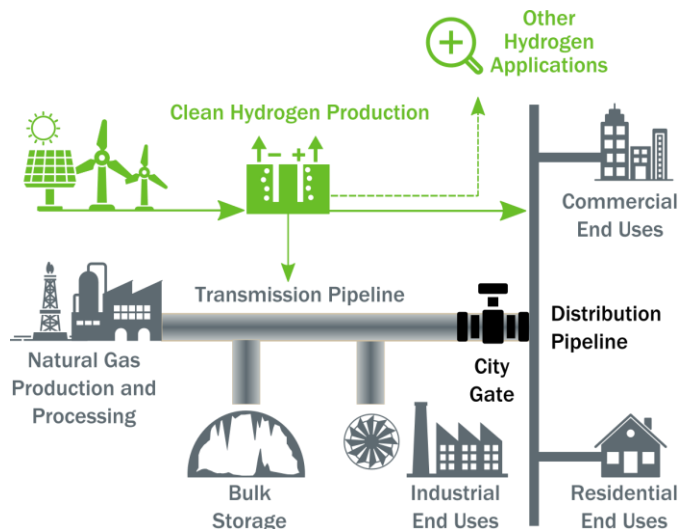


Maintaining energy delivery could limit the H<sub>2</sub> blending ratio to ~30%, resulting in ~6% life cycle GHG emissions reduction

#### Techno-economic Analysis



Providing economic analysis of preparing transmission pipelines to blend H<sub>2</sub> (BlendPATH software release date: Q1 2024)



Learn more at an upcoming H2IQ Hour

<https://www.energy.gov/eere/fuelcells/hydrogen-and-fuel-cell-technologies-office-webinars>

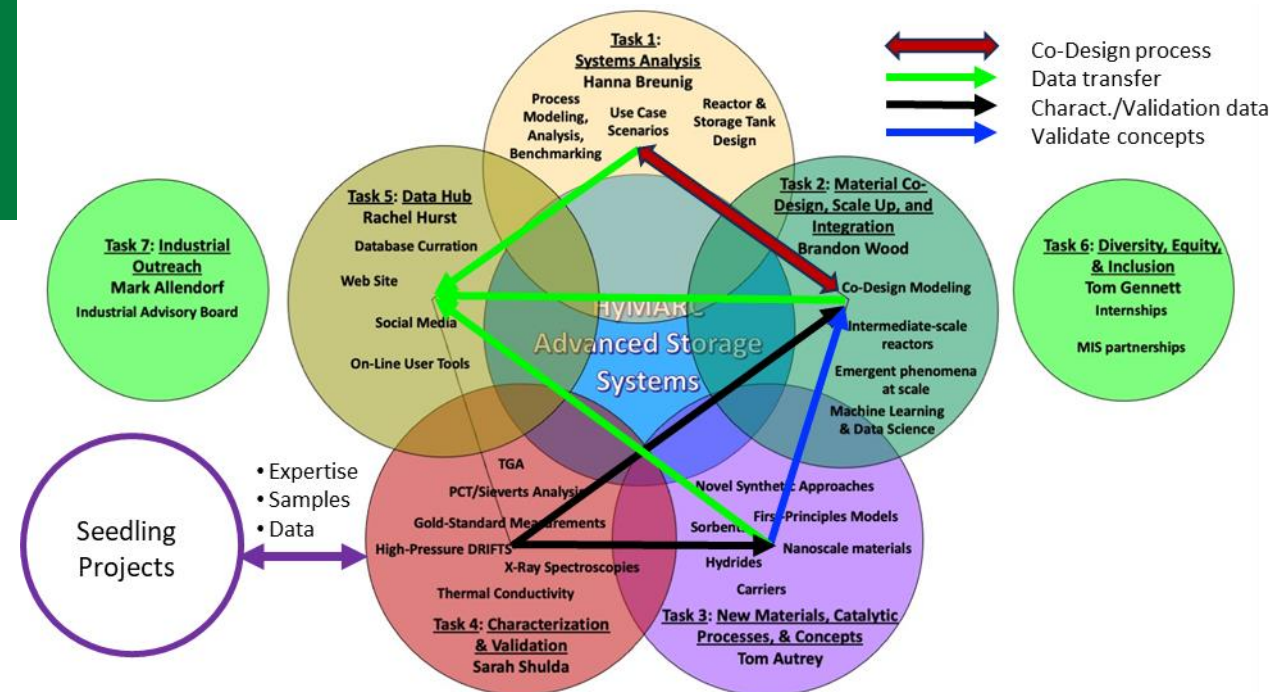


Visit the HyBlend™ Initiative webpage for details and links to tools and publications

# Hydrogen Materials – Advanced Research Consortium

## Accelerating development of H<sub>2</sub> storage materials that meet leveled performance and cost of physical storage methods for specific use cases

- Synergistic approach incorporating system analysis, modeling and materials characterization to focus on most promising applications
- Iterative Co-design approach to optimize material and system performance to meet application needs – focusing on higher TRL activities
- World-class characterization and validation capabilities
- Support other DOE-supported RD&D efforts
- Engage with industry stakeholders



### Industrial Advisory Board – Initial Cohort:

- Ammobia
- Baker Hughes
- BST Systems
- Chevron
- HGmotive
- GKN Hydrogen
- Numat
- SoCalGas
- US Army

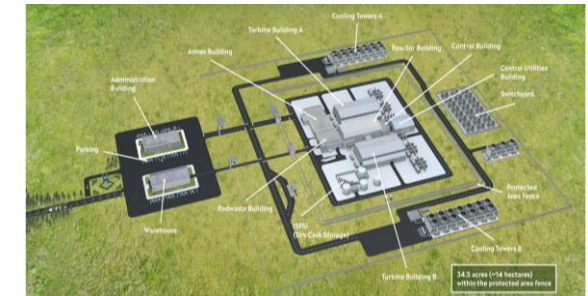
Increasing interactions with industrial partners to demonstrate, validate and commercialize HyMARC-developed technologies for commercial applications



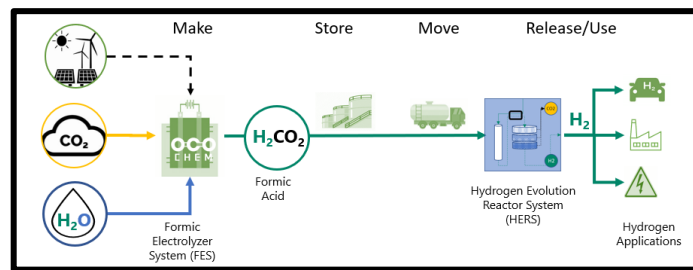
HyMARC developed hydride composites for Drone applications (TCF project)



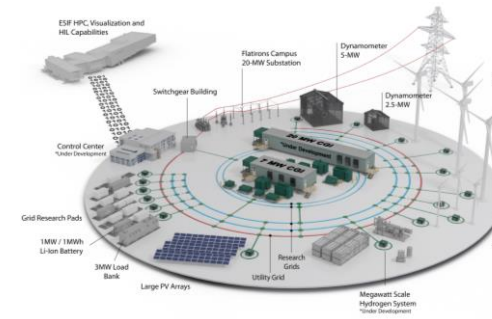
HyMARC developed amide materials for transportation (SoCal funded)



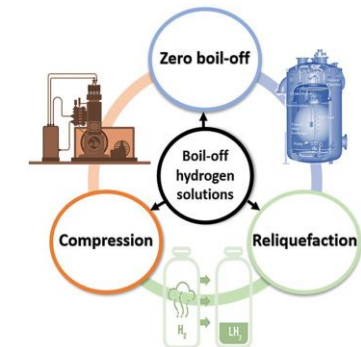
HyMARC's formate-based materials for H<sub>2</sub> generated with Small Modular Reactors (NUSCALE funded)



Formic acid hydrogen storage demonstration based on HyMARC initiative (DoE)



HyMARC initiated collaboration for MH bulk storage (Aries, H2@Scale)



HyMARC developed hydride/sorbent materials for LH<sub>2</sub> boil off capture (H2Shot)

# SHASTA – Project Objective & Goals

## Goal:

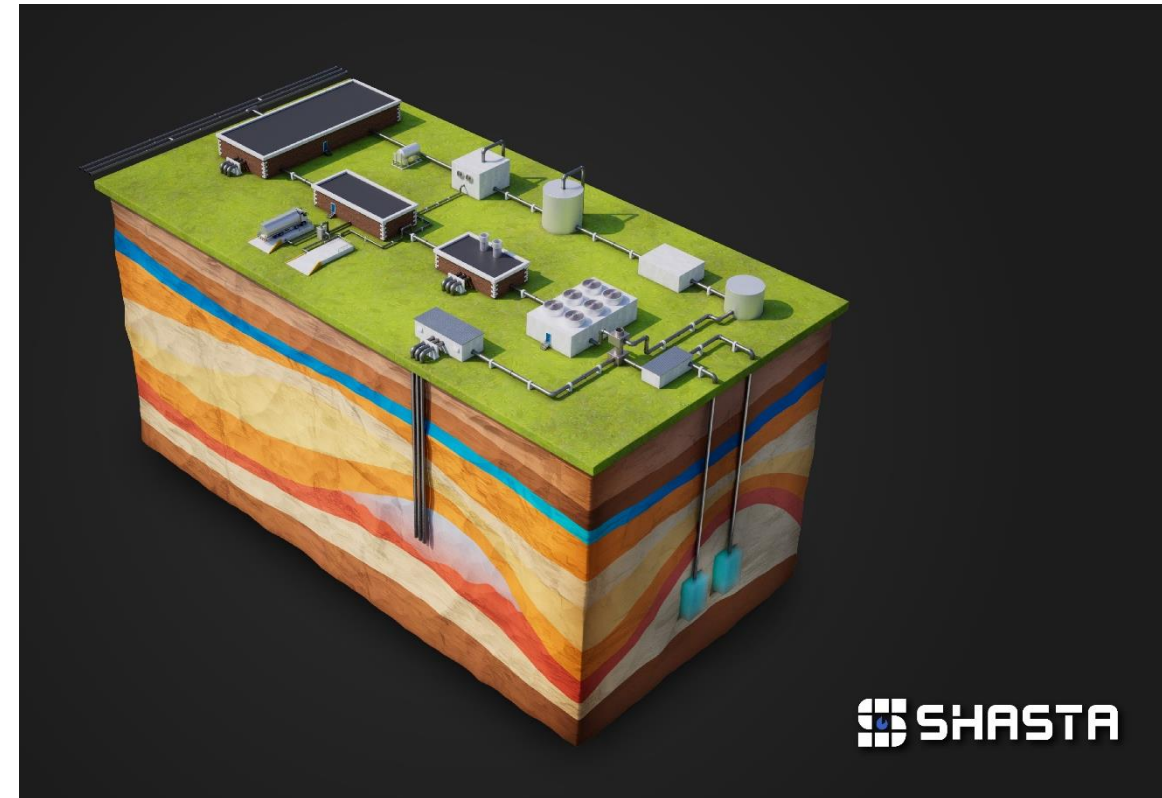
- Leverage expertise at the U.S. Department of Energy’s (DOE) National Laboratory system through the ***Office of Fossil Energy and Carbon Management (FECM)*** funded Subsurface Hydrogen Assessment Storage & Technology Acceleration (SHASTA) project to provide DOT-PHMSA with the scientific basis to support safe and effective regulatory guidance and oversight for underground hydrogen storage (UHS)

## Purpose:

- Identifying sources for potential hydrogen resource and storage reservoir asset loss
- Identifying possible mitigations/remedies relative to governing entities that may have regulatory primacy or authority

## Objectives:

- Identify regulatory needs for Underground Gas Storage (UGS) operations to define UHS metrics
- Assess existing UGS facilities’ suitability for hydrogen storage
- Quantify operational expectations and risk for hydrogen resource loss and asset degradation based on geologic and operational conditions



FE001

# Example Supported Project Activities: Bulk Storage

# Bulk Materials-based Storage of H<sub>2</sub>

## High-Efficacy Validation of Hydride Mega Tanks at the ARIES Lab (HEVHY METAL)

*This project will advance materials-based hydrogen storage technologies by large-scale demonstration and identification of deployment pathways.*

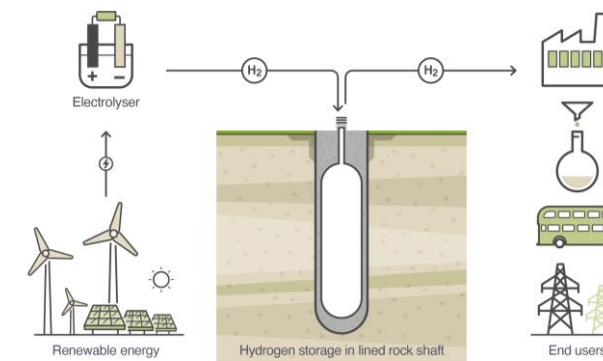
- Demonstrate installation of two HY2MEGA subsystems with MW-scale **green H<sub>2</sub>** infrastructure
  - Validate performance: Rates, capacity, efficiency
  - Investigate supply, demand side techno- economics
  - Identify potential deployment pathways
- Will be evaluated for direct charging by 1.25 MW PEM electrolyzers and direct discharge to 1 MW PEM fuel cells
  - Performance (capacity, charge/discharge rate) validation
  - Energy efficiency determination
  - Performance comparison with compressed H<sub>2</sub> storage
  - TEA analysis and comparison with other technologies



# Engineered Subsurface Bulk Hydrogen Storage Demonstration

- **Scope:** Expanded at-scale H<sub>2</sub> storage (10 metric tonnes) at NREL's Flatirons Campus to support increased hydrogen production (5+ MW electrolysis) and other planned hydrogen potential end use demonstrations (e.g. grid storage, HD vehicle fueling, power generation, SAF, green steel, ammonia, etc.)

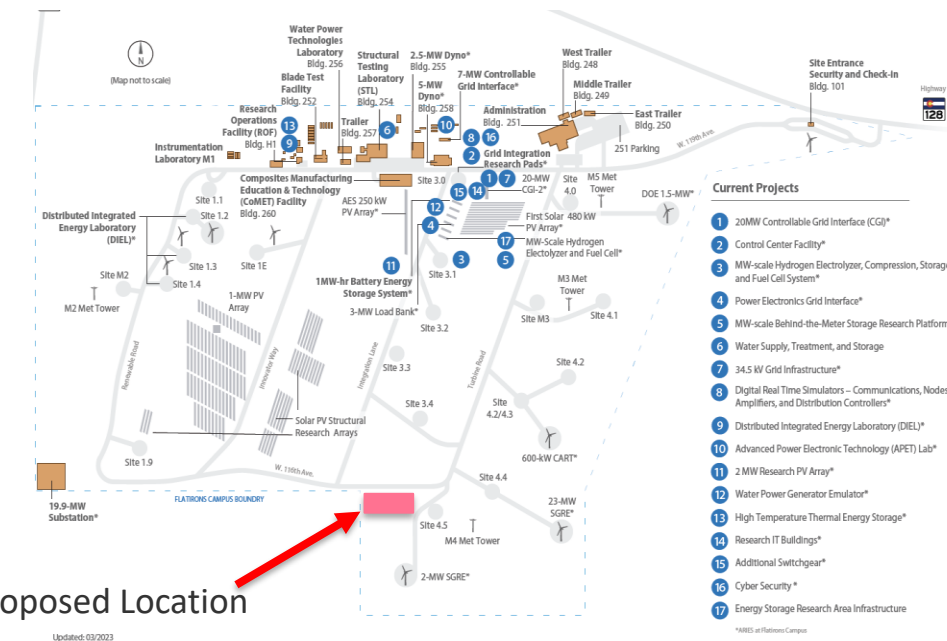
## Clean Hydrogen Production and End Uses



- **Timeline:**

- Feasibility and Scoping Study – February – June 2023
- RFP Issued – March 2024
- Proposal due date – May 16, 2024
- Select Contractor for Design/Construction – June 2024
- Design, Geotech and Permitting – October 2024 – September 2025
- Construction - October 2025 – November 2026

## NREL's Flatirons Campus

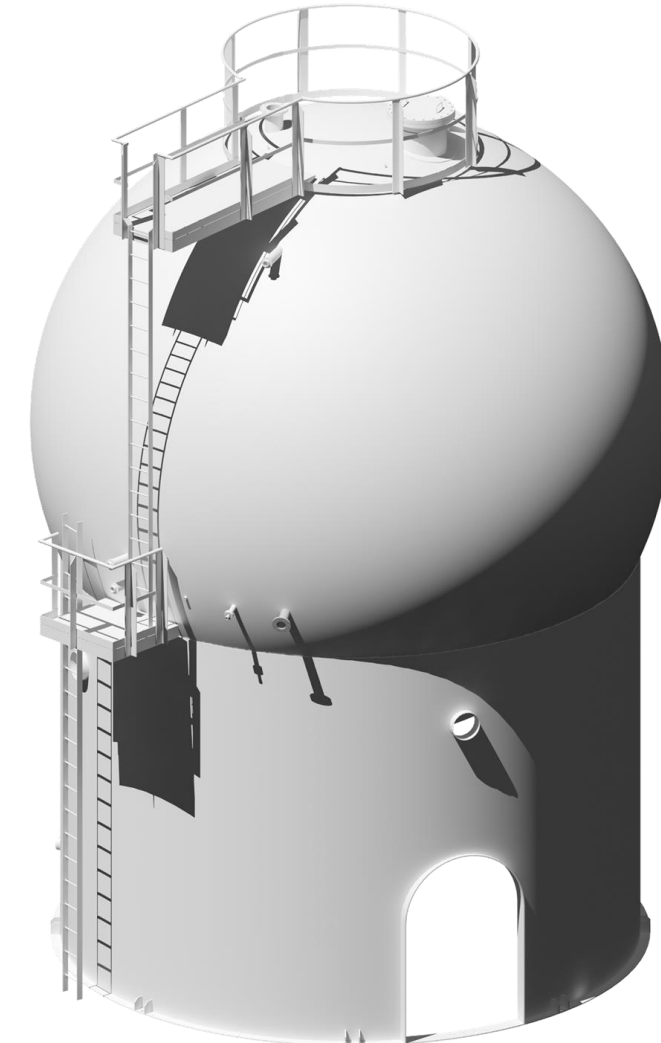
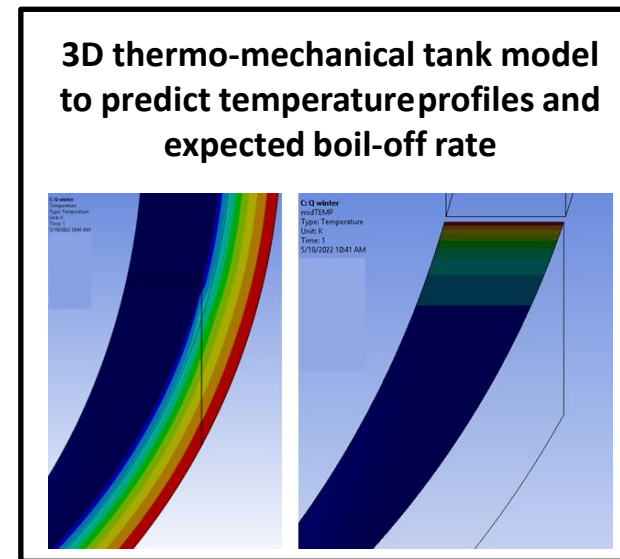


# Commercial-Scale Liquid H<sub>2</sub> Energy Storage for International Trade

- First-of-its-kind, affordable tank design for large-scale LH<sub>2</sub> storage
- Storage capacity: 20,000 m<sup>3</sup> – 100,000 m<sup>3</sup> (1420 – 7100 tons)
- Double-walled, insulated tank (non-vacuum insulation system)

## Status/accomplishments:

- Validation experiments complete on CS-900 cryostat, will support continued verification of tank performance modeling
- 20 m<sup>3</sup> demo tank design and NASA Marshall Space Flight Center (NASA-MSFC) location finalized
- Site preparation completed and tank fabrication about to begin
- Projected commissioning late this year, followed by performance testing with LH<sub>2</sub>



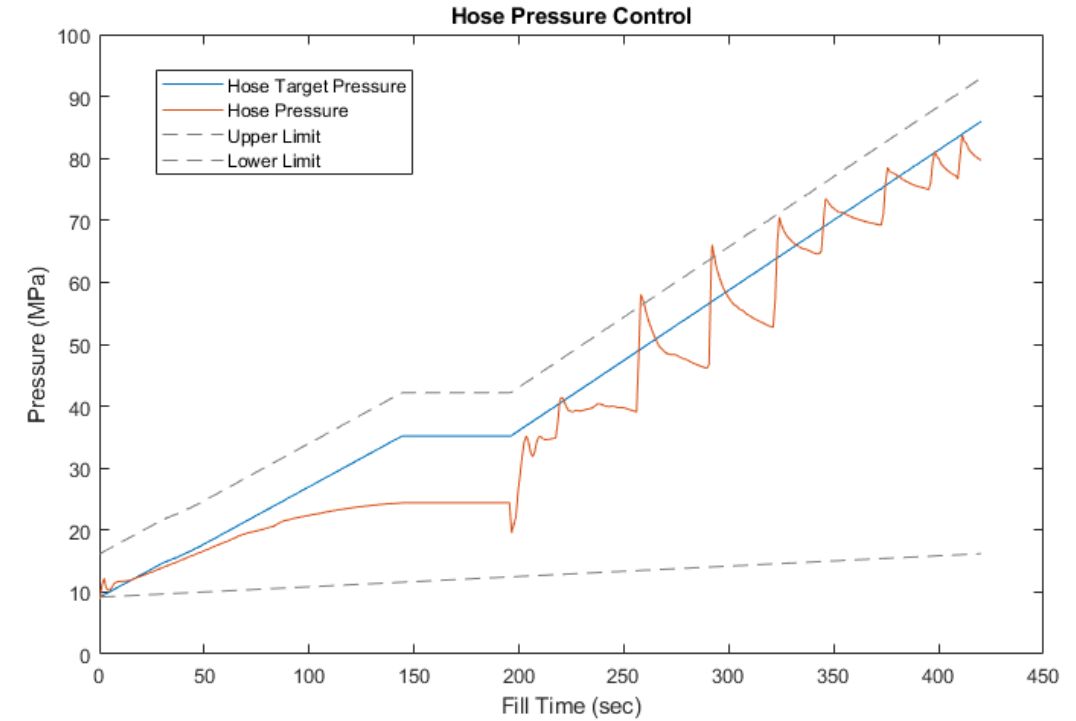
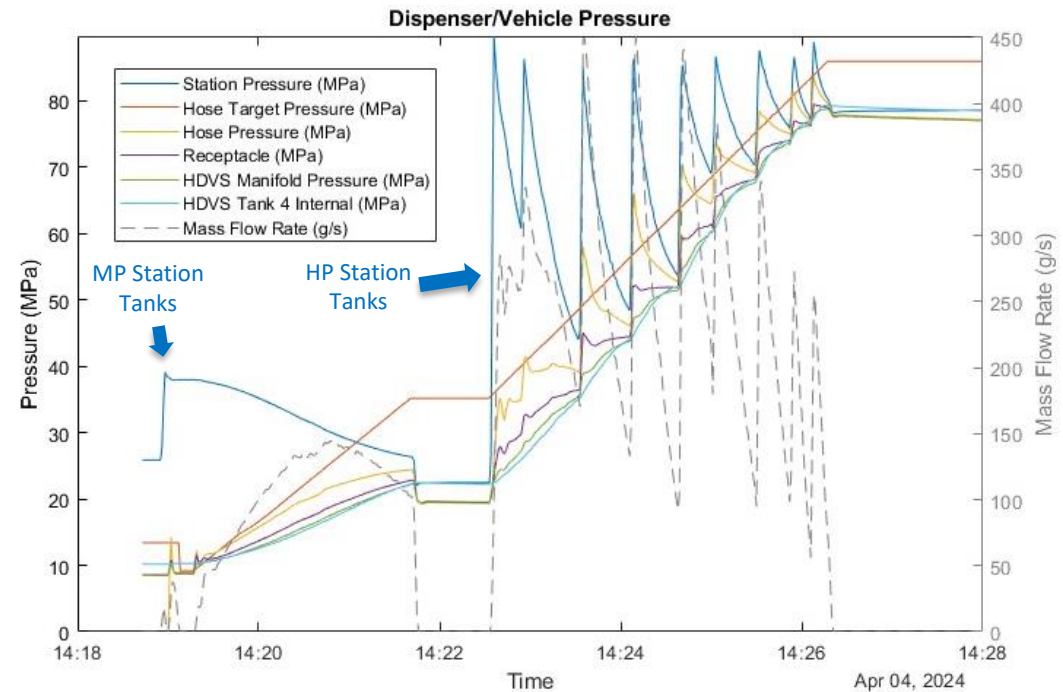
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# Example Supported Project Activities: Key Projects

# Heavy-Duty Fueling Protocol Testing



NREL is one of the first to implement and validate a HD fast flow hydrogen fueling protocol with HD fast flow fueling hardware in a real-world environment, a significant step towards rollout of MD/HD fueling infrastructure for hydrogen vehicles



Completed a **70.5 kg fill in 7 minutes**, meeting the fill time estimates within NREL's vehicle simulator tank array safety limitations

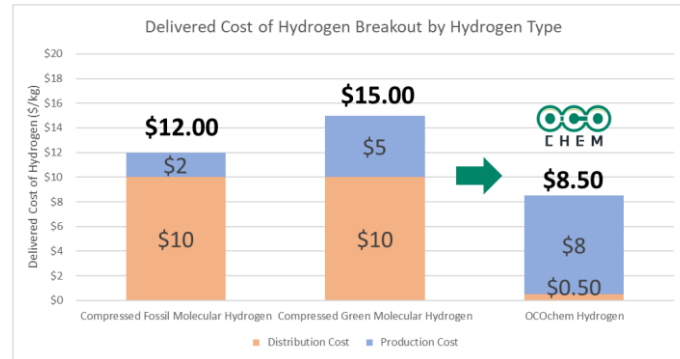
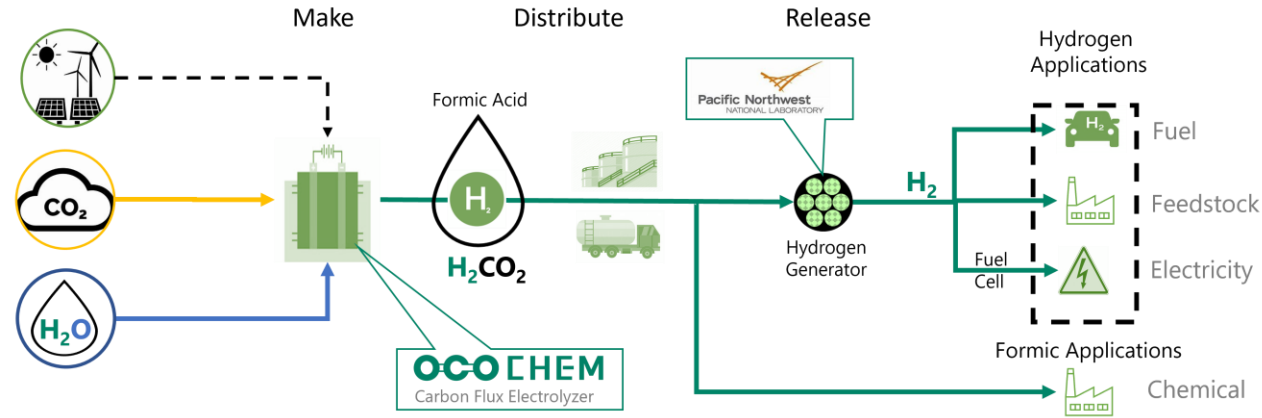
Validated the **SAE J2601/5 protocol (MCF-HF-G)** with preproduction HD refueling hardware and advanced wireless communications

SCS031

## Formic Acid-based Hydrogen Energy Production and Distribution System (Formic HEPADS)

*This project will develop and demonstrate at an industrially relevant size an end-to-end cost-effective high performance novel clean liquid hydrogen carrier (LHC) production, distribution and dispensing supply chain using formic acid as the LHC.*

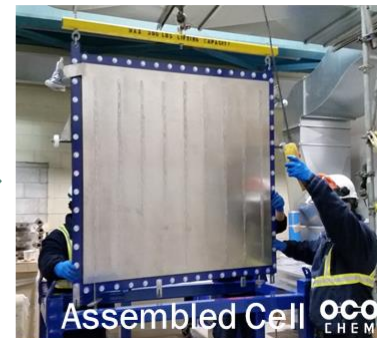
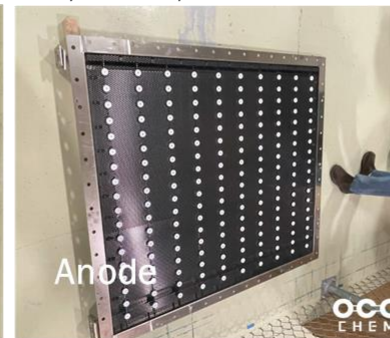
- Demonstrate world’s largest CO<sub>2</sub>-Formate electrolyzer for **green H<sub>2</sub>** infrastructure
  - Methodically scale and optimize formate technology
  - Validate performance: Rates, purity, efficiency
  - Validate favorable techno-economics



Cathode current collector and GDE support plate with the CO2 flow assembly underneath



Anode (plate coated with MMO) plate with the anolyte flow assembly underneath

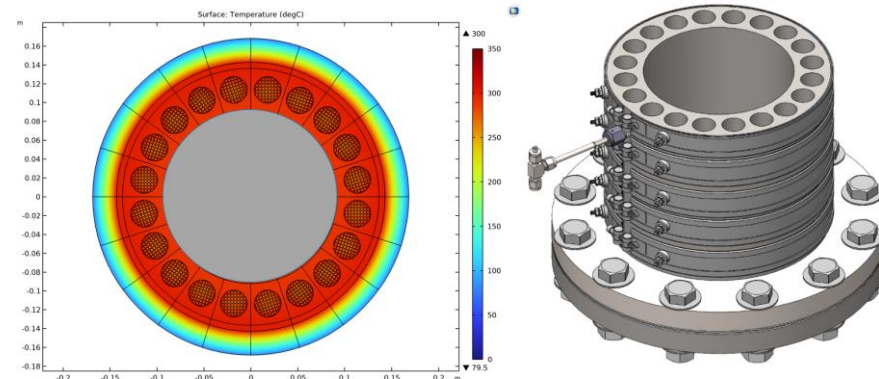
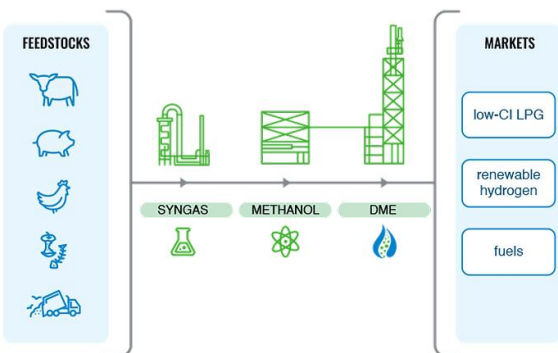
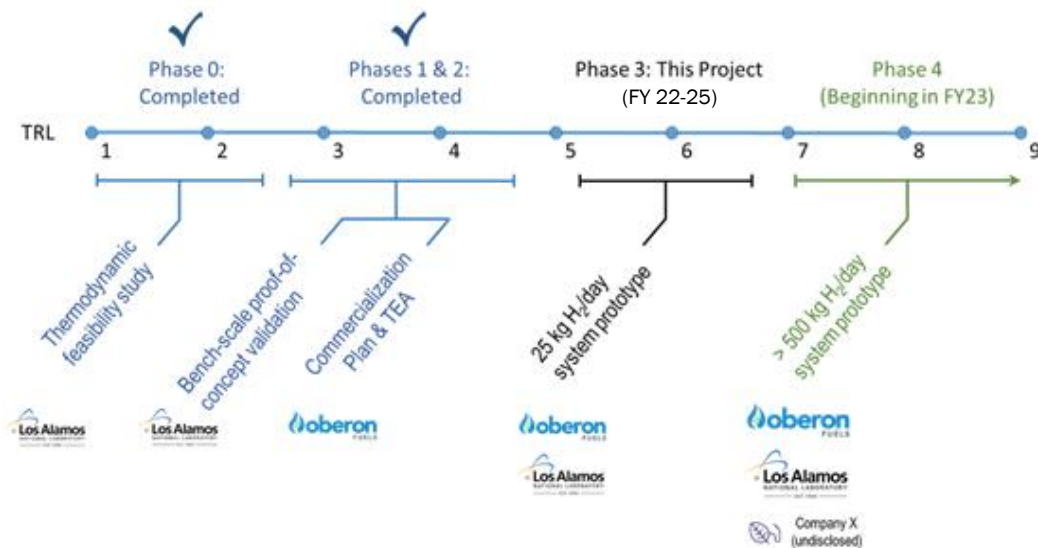


# Hydrogen Carriers – Dimethyl Ether

## DME as a Renewable Hydrogen Carrier: Innovative Approach to Renewable Hydrogen Production

*This project will commercialize renewable dimethyl ether (DME) as a fuel cell grade hydrogen carrier capable of storing and transporting hydrogen on a global scale.*

- Design, build, and demonstrate DME-SR process in novel dual catalyst bed
  - Produce 25 kg/day fuel cell grade H<sub>2</sub>
  - Validate H<sub>2</sub> quality via fuel cell performance and testing
  - Full documentation on design and bill-of-materials for integration in Oberon’s phase 4 commercialization plan



Final Reactor Design and Comsol Model

ST242

## High-tensile-strength carbon fiber is the largest cost contributor to H<sub>2</sub> tanks

### Hexagon-led project downselected to Phase II

- Effort targeted 50% reduction in CF contribution to tank costs

### Accomplishments

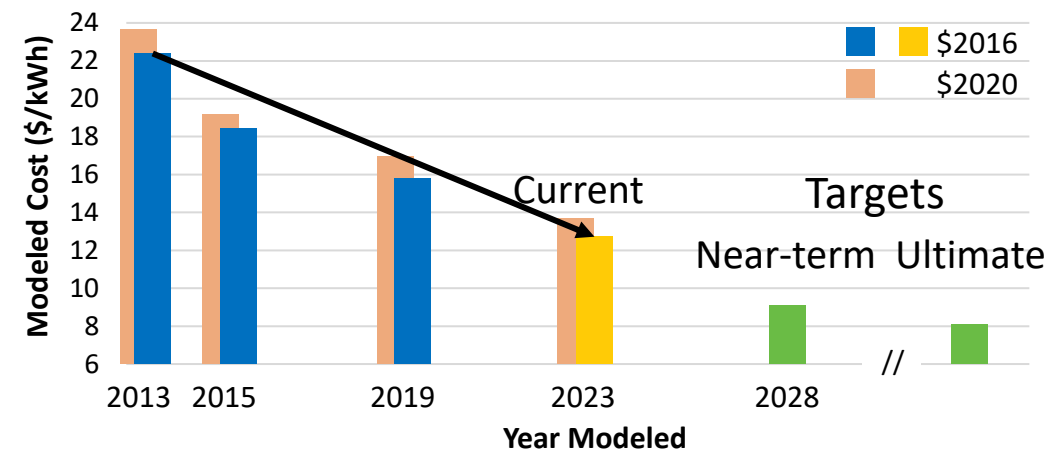
#### Carbon Fiber

- Strength: > 725 ksi
- Modulus: > 35 Msi
- 1.5x conversion line speeds
- Projected CF cost: \$15/kg - \$20/kg

#### Tanks

- Projected tank cost: \$12.8/kWh

Modeled Onboard Storage System Costs  
700 bar, Type IV, 5.6 kg usable H<sub>2</sub>, 100k system/year

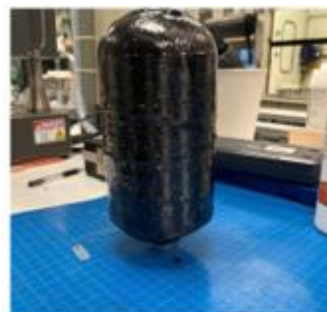
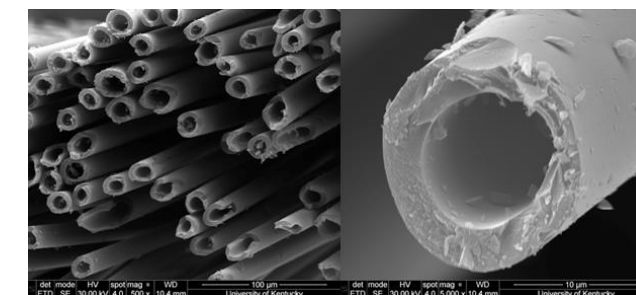


### High-Strength Hollow Carbon Fibers – Univ. of Kentucky

- Accomplishments
  - Precursor filament diameter 25 μm OD, 14 μm ID (Target 14 μm OD, 9 μm ID)
  - CF filament diameter 18 μm OD, 10 μm ID (Target 7 μm OD, 4.7 μm ID)
  - Demonstrated 50% faster oxidation potential
- Key Focus in Phase II
  - Reduced filament diameters & improved filament quality



ST238



Subscale test vessel  
(w/ commercial fibers)



Reclaimed carbon fiber  
spool

# AMR Schedule

# H<sub>2</sub> Infrastructure Technologies Session Schedule

DOE Hydrogen Program 2024 AMR Preliminary Program-at-a-Glance																	
	Tuesday, May 7							Wednesday, May 8							Thursday, May 9		
	Hydrogen Production Technologies	Hydrogen Infrastructure Technologies	Fuel Cell Technologies	Systems Development and Integration	Analysis, Codes and Standards	Intra-Agency Activities		Hydrogen Production Technologies	Hydrogen Infrastructure Technologies	Fuel Cell Technologies	Systems Development and Integration	Interagency Activities	Intra-Agency Activities		Hydrogen Infrastructure Technologies	Fuel Cell Technologies	Systems Development and Integration
Room	Regency E	Regency AB	Potomac III-VI	Regency CD	Regency F	Washington	Regency E	Regency AB	Potomac III-VI	Regency CD	Regency F	Washington	Regency AB	Potomac III-VI	Regency CD		
8:00 AM	Continental Breakfast						8:00 AM	Continental Breakfast						8:00 AM	Continental Breakfast		
8:30 AM							8:30 AM	IA013					8:30 AM	ST237			
9:00 AM	P000	IN000	FC000	SDI000	SA-SCS000	FE000	9:00 AM	P216	SC5037	FC352	TA048	IA001	9:00 AM	ST241	FC331	TA053	
9:30 AM	ELY-BIL001	IN025	FC160	TA056	SA187	FE001	9:30 AM	P218	IN043	FC363	TA037	IA002	9:30 AM	ST001	FC330	TA052	
10:00 AM	SDI006	H2041		TA057	SA188	FE005	10:00 AM	P209	SC5042	FC327	TA030	IA003	10:00 AM	ST235	FC355		
10:30 AM	Break						10:30 AM	Break						10:30 AM	Break		
11:00 AM	P148	IN039	FC339	TA058	SA178	FE003	11:00 AM	P213	ST127	FC336	TA062	IA004	BETO000	11:00 AM	OCED001		
11:30 AM		IN001a		SCS031	SA174	FE004	11:30 AM	P214		FC344	SDI002	IA006	WETO000	11:30 AM	OCED002		
12:00 PM		IN001b		SA181	FE016	12:00 PM	P215	ST209		FC345	SDI001	IA007	SETO000	12:00 PM	OCED003		
12:30 PM	Lunch (provided)						12:30 PM	Lunch (provided)						12:30 PM	Lunch (provided)		
1:45 PM	P196	IN021	FC353	TA016	SCS019	FE002	1:45 PM	P208	ST212	FC348	TA018/SDI004	IA010	BES000	1:45 PM	OCED004		
2:15 PM		IN016	FC337	TA059	SCS028	FE007	2:15 PM	P210	ST213	FC347	TA028	IA011	EJE000	2:15 PM	OCED005		
2:45 PM		IN036	FC338	TA065	SCS021	FE011	2:45 PM	P212	ST217	FC346	TA039	IA012	AMMTO000	2:45 PM	OCED006		
3:15 PM	Break						3:15 PM	Break						3:15 PM	OCED007		
3:45 PM	P204	IN015	FC349	TA001	SCS001	FE008	3:45 PM	P211	ST218	MNF-BIL001	NE001		OTT000	3:45 PM			
4:15 PM	P170	IN040	FC350	TA029	SCS011	FE010	4:15 PM	P217	ST234		TA044		ARPAE000	4:15 PM			
4:45 PM	P200	IN034	FC351	TA063	SCS010	FE006	4:45 PM	P205	ST242	FC354	TA051/TA060		EIA000	4:45 PM			
5:15 PM	P179	IN035				FE009	5:15 PM	P206	ST243		TA064			5:15 PM			

# H<sub>2</sub> Infrastructure Technologies Project Presentations

- Orals – Regency AB Ballroom (this room)
  - Infrastructure today through morning break tomorrow
  - Storage tomorrow after morning break through morning break Thursday
  - ***Note: 8:30 AM start to sessions on Wednesday and Thursday***
  - Thursday following storage
    - Selected H<sub>2</sub> Hubs presenting in this ballroom
- Posters – Independence Ballroom Level
  - Wednesday evening (May 8, 5:30 – 7:00 pm) – section B (to the right)

# Join Our Clean Energy Workforce Today

*Stop by the table outside Independence Ballroom at lunch today to learn more!*

EERE is driving the clean energy revolution by funding the innovation that's building the technologies that will forever change the way energy is generated and consumed. So now is a great time to become a **Clean Energy Champion** by joining EERE today!

Together we strive to:

- **Build the clean energy economy in a way that benefits all Americans.**
- **Create good paying jobs for the American people.**
- **Overcome the technological, economic, and institutional barriers to the development of hydrogen and fuel cells.**
- **Make renewable energy cost-competitive with traditional sources of energy.**
- **Increase access to domestic, clean transportation fuels.**
- **Reduce the carbon footprint of buildings.**
- **And so much more.**

EERE is committed to building a clean energy workforce with skilled professionals from diverse backgrounds. If interested in learning more about **becoming a Clean Energy Champion & joining the Clean Energy Revolution, stop by our booth to speak with our EERE Talent Acquisition representatives today!**

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# Thank You

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