U.S. DEPARTMENT OF ENERGY
Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

HFTO H_2 Infrastructure Technologies Subprogram Overview

Ned Stetson, HFTO – H_2 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

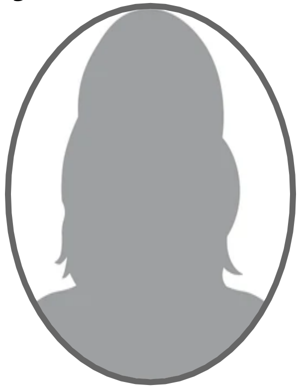
Technology Managers/Technical Project Officers

Mark Richards

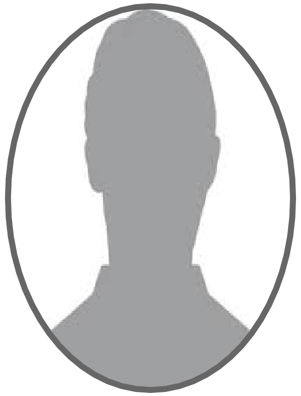
Marika Wieliczko

Zeric Hulvey

Kevin Carey



New TM/TPO



New TM/TPO

ORISE Fellows

Asha-Dee Celestine

Zakaria Hsain

Lab Detailee

Abhi Karkamkar

Support Contractors

Josh Farley

Nikkia McDonald

Haboon Osmond

H_2 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_2 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

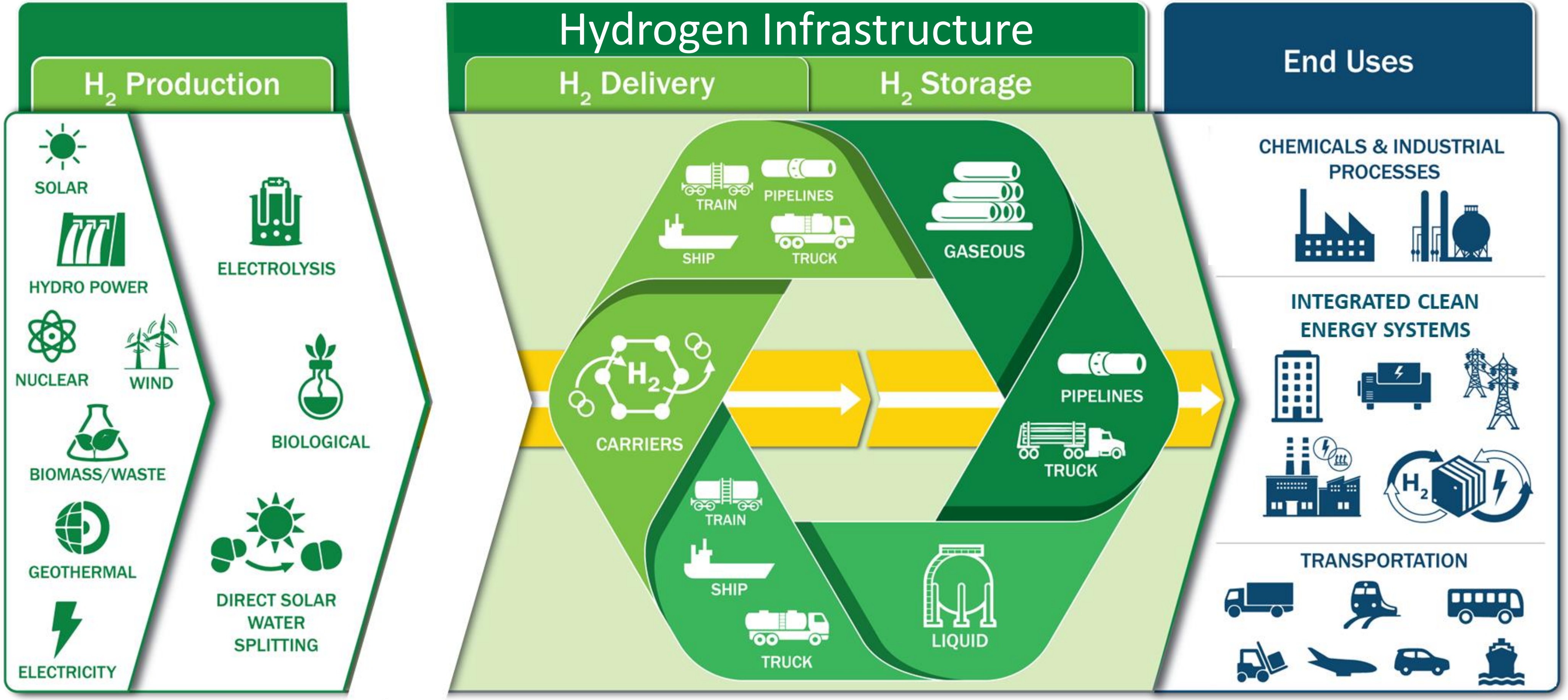
Cross-Agency Collaborations					
H_2IT	DOC-NIST	DOC-NOAA	NASA	DOD	DOT

Regional and International Collaborations		
IEA H_2 TCP	ISO TC197 US TAG	Bilateral Collaborations

Industry Engagements
21st Century Truck Partnership
U.S. DRIVE
HyMARC
H-MAT
HyBlend
Workshops/RFIs

Hydrogen Infrastructure Technologies

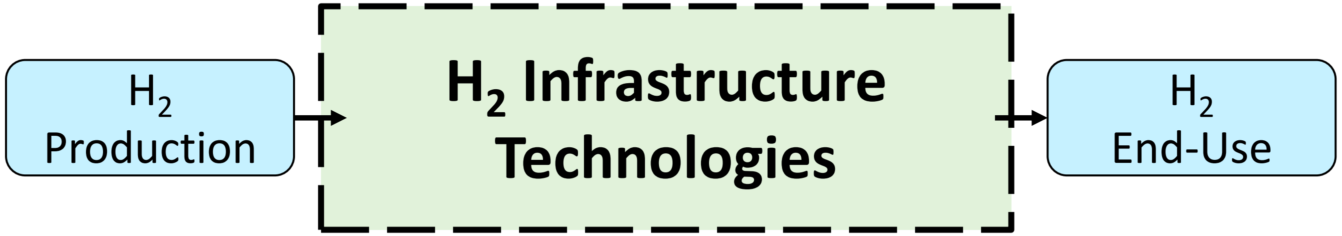
Mission: To carryout RD&D activities to develop H_2 infrastructure technologies to enable achieving the National Hydrogen Strategy and decarbonization goals



From producing hydrogen molecules through dispensing to end-use applications

What are H_2 Infrastructure Technologies?

Everything needed to get the produced H_2 molecule to the end-use application



- **Hydrogen within the infrastructure may be as a *<u>gas, cryogenic liquid, or materials-based carrier</u>***
- **May include any of the following:**
  - **H_2 Conditioning:** compression, liquefaction/vaporization, H_2 carrier hydrogenation/dehydrogenation, purification, temperature control
  - **H_2 Transmission/Distribution:** on-road (e.g., tube/tanker trailers), pipelines, rail, marine, bulk buffer storage, transfers, sensors/monitoring
  - **H_2 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_2 to the end-user, i.e., cost of production *<u>+ total cost of delivery and dispensing</u>*

To Meet Decarbonization Goals – Focused on Three Sectors

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

\- ***Developing Scenarios for Each***

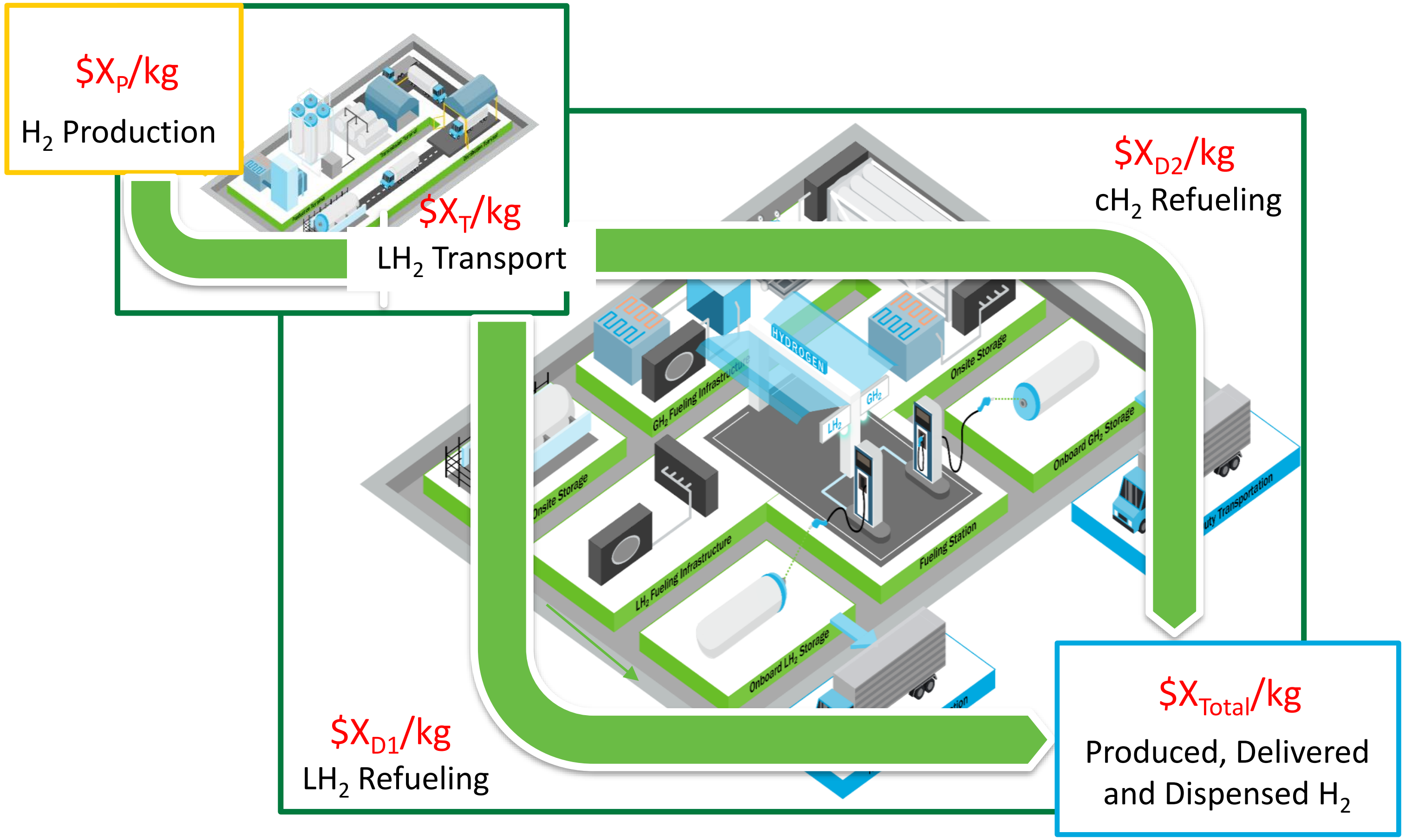
Example: MD/HD Refueling

Assume LH_2 delivery to stations in near-term

Need to consider both cH_2 and LH_2 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

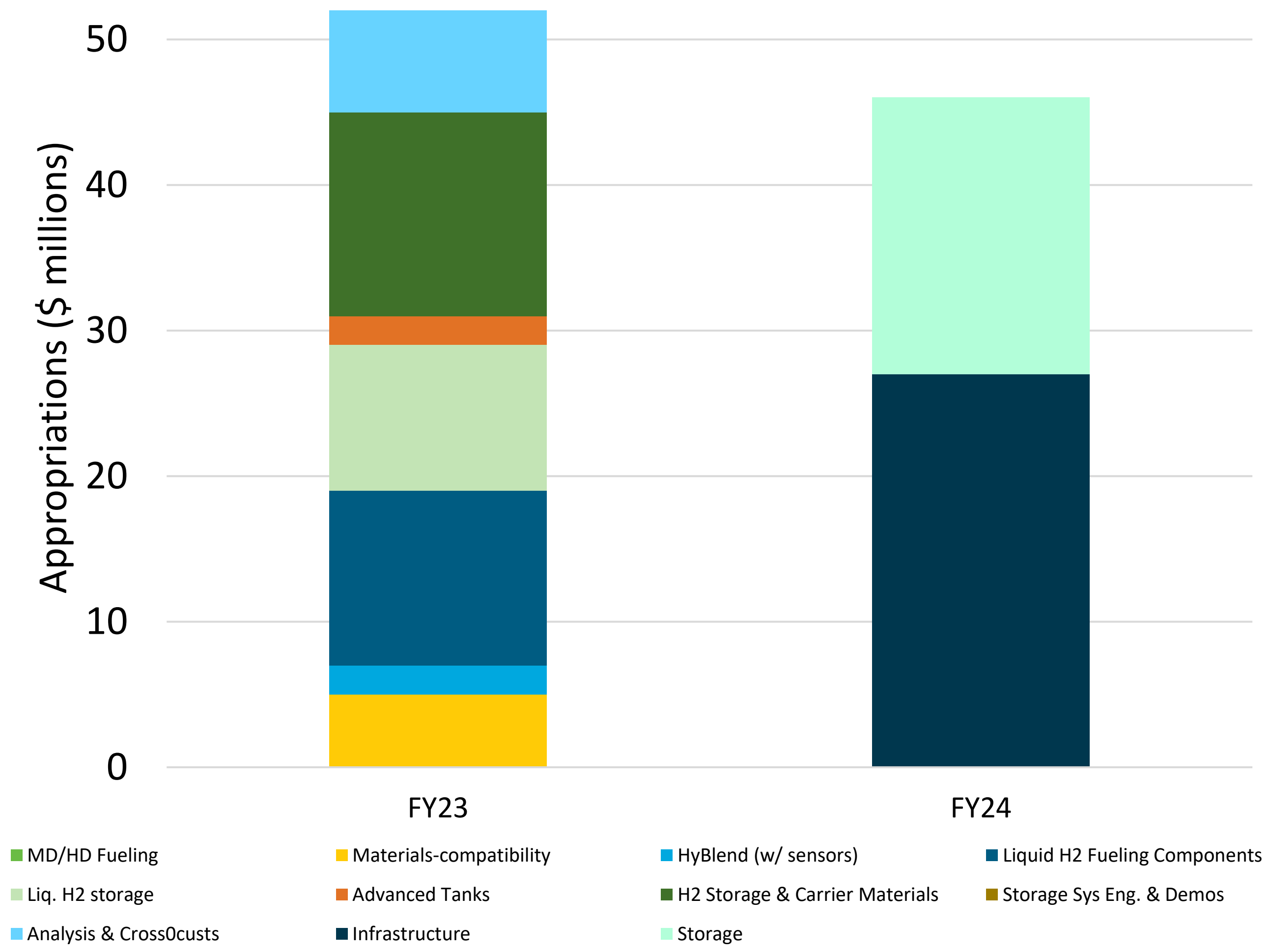
Key Stakeholder Input at the MD/HD Transportation Sector Workshop

- 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_2 Infrastructure Technologies Appropriations

FY23 Appropriations
$52 million

FY24 Appropriations
$46 million



Program Direction

H_2 Infrastructure Focus Areas for FY24

- High-throughput fueling components (FOA)
- H_2 Carrier demonstrations for non-vehicle apps (Lab Call)
- Bulk sub-surface storage (NREL)
- Materials-compatibility for H_2 service (H-Mat)
- Blending of H_2 with natural gas (HyBlend)
- H_2 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_2 Infrastructure Technologies Activities

- **FY23 HFTO FOA**
  - Hydrogen Carrier Development – 7 new awards

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

  - Onboard Storage Systems for Liquid Hydrogen – 3 new awards

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

FOA Topics for H_2 Infrastructure Technologies Activities

- **FY23 HFTO FOA (continued)**
  – Liquid Hydrogen Fueling/Transfer Components and Systems – 3 new awards

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

- **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_2 Infrastructure Technologies Activities

- **FY23 H_2 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
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
Solve Technology and Research, Inc.	Multi-Gap Fabry Perot Fiber Optic Sensor for Real-Time and Cumulative Leak Detection and Quantification
C56-18g Liquid Hydrogen Fueling and Delivery Components	
Eta Space	Low Loss LH2 Servicing System for Heavy Duty Vehicle Fueling
Kepner Products Company	Liquid Hydrogen Fueling and Delivery Components
Tech4Imaging LLC	Two-Phase Hydrogen Mass Flow Meter for Fuel Transfer in Ground Based Infrastructure

- **FY24 H_2 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

Hydrogen Materials Compatibility R&D

H-Mat Hydrogen Materials Compatibility Consortium SM

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

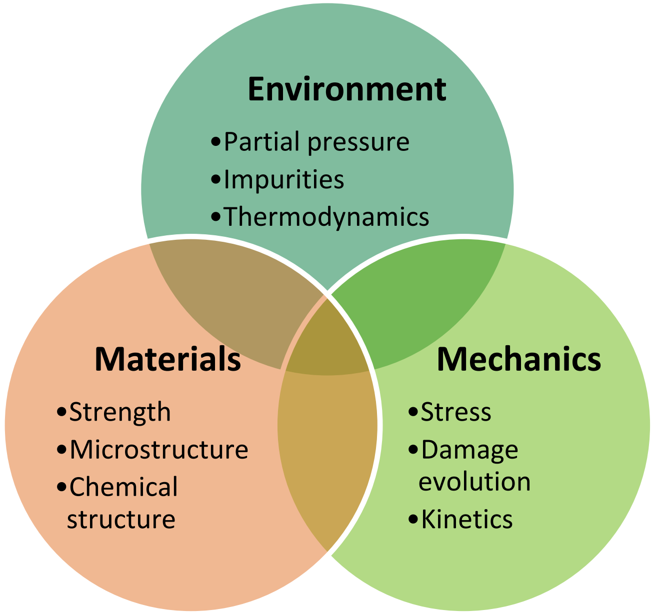
- Integrate innovative computational and experimental activities to inform mechanistic understanding at nm-length scales
- Employ model systems to describe materials performance in high-pressure hydrogen environments
- Build scientific framework across length scales to engineer hydrogen compatibility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

Sandia National Laboratories

Pacific Northwest NATIONAL LABORATORY

OAK RIDGE National Laboratory

Argonne NATIONAL LABORATORY



- **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

HyBlend
U.S. DEPARTMENT OF ENERGY

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

Phase I

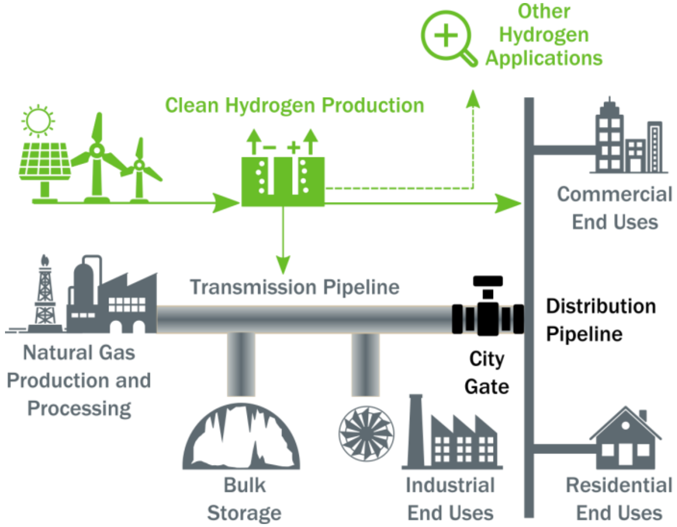
Two-year, $15MM CRADA Project

- 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**



IN035

Key Findings and Outputs

Metals R&D	SNL	Providing scientific bases and probabilistic tools for structural integrity assessment of H_2 pipelines (HELPR software release date: Q1 2024)
Polymer R&D	PNNL	Blended gases affect the semicrystalline morphology of high-density polyethylene (HDPE), impacting toughness / pipe stability on polymer chemistry
Life-Cycle Analysis	ANL	Maintaining energy delivery could limit the H_2 blending ratio to ~30%, resulting in ~6% life cycle GHG emissions reduction
Techno-economic Analysis	NREL	Providing economic analysis of preparing transmission pipelines to blend H_2 (BlendPATH software release date: Q1 2024)

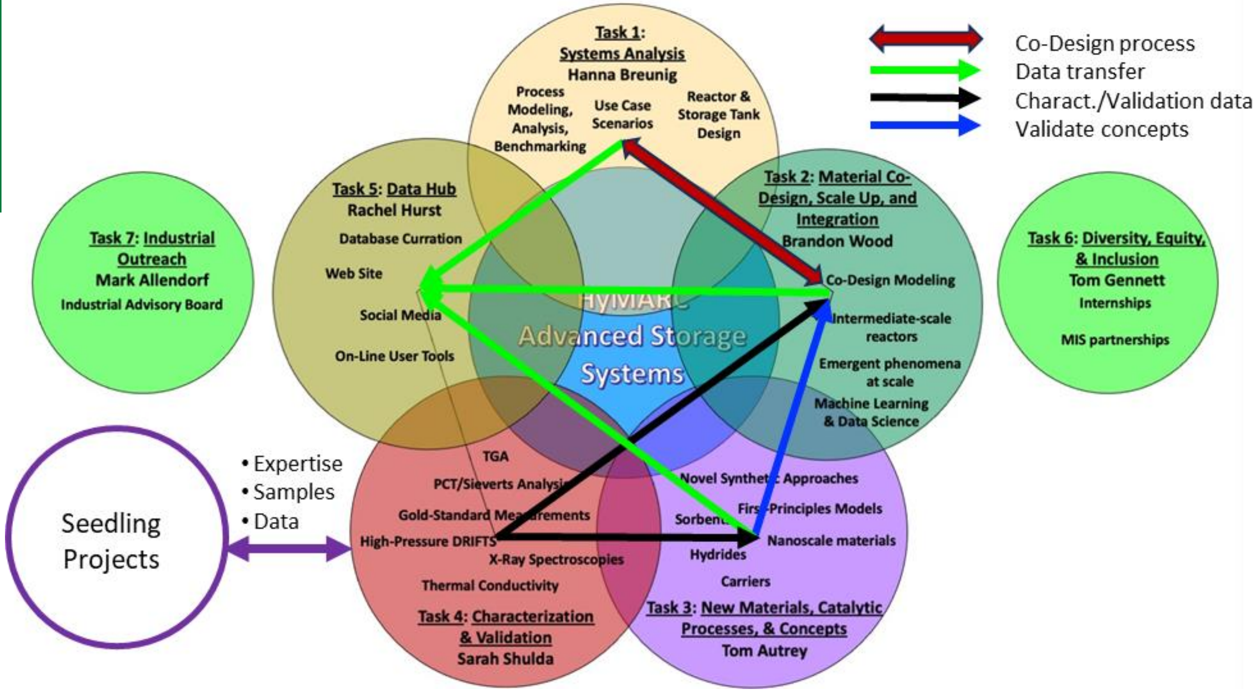
Learn more at an upcoming H2IQ Hour
https://www.energy.gov/eere/fuelcells/hydrogen-and-fuel-cell-technologies-office-webinars

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

Hydrogen Materials – Advanced Research Consortium

Accelerating development of H_2 storage materials that meet levelized 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

Sandia National Laboratories | NREL National Renewable Energy Laboratory | Lawrence Livermore National Laboratory | Pacific Northwest National Laboratory | Berkeley Lab

ST127

HyMARC: Design, Develop, Deploy Initiatives with Industry

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

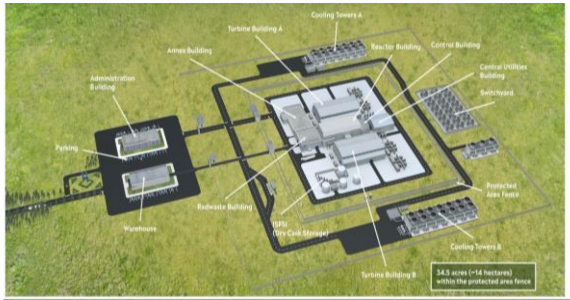
Honeywell — THE POWER OF CONNECTED

HyMARC developed hydride composites for Drone applications (TCF project)

SoCalGas — A Sempra Energy utility

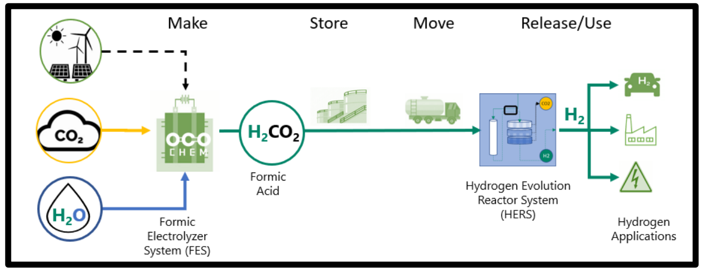
HyMARC developed amide materials for transportation (SoCal funded)

NUSCALE — Power for all humankind



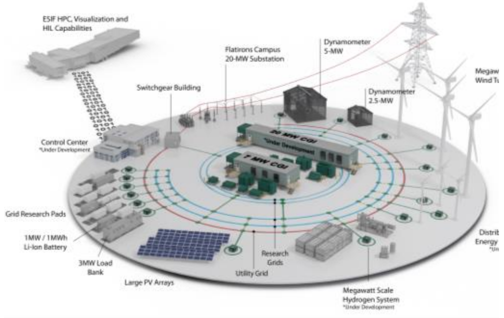
HyMARC's formate-based materials for H_2 generated with Small Modular Reactors (NUSCALE funded)

OCOCHEM



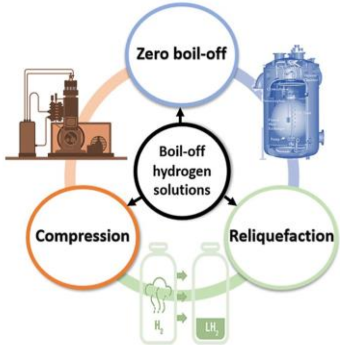
Formic acid hydrogen storage demonstration based on HyMARC initiative (DoE)

GKN HYDROGEN — SoCalGas — A Sempra Energy utility



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

STOKE — AIRBUS



HyMARC developed hydride/sorbent materials for LH_2 boil off capture (H2Shot)

SHASTA – Project Objective & Goals

Goal:

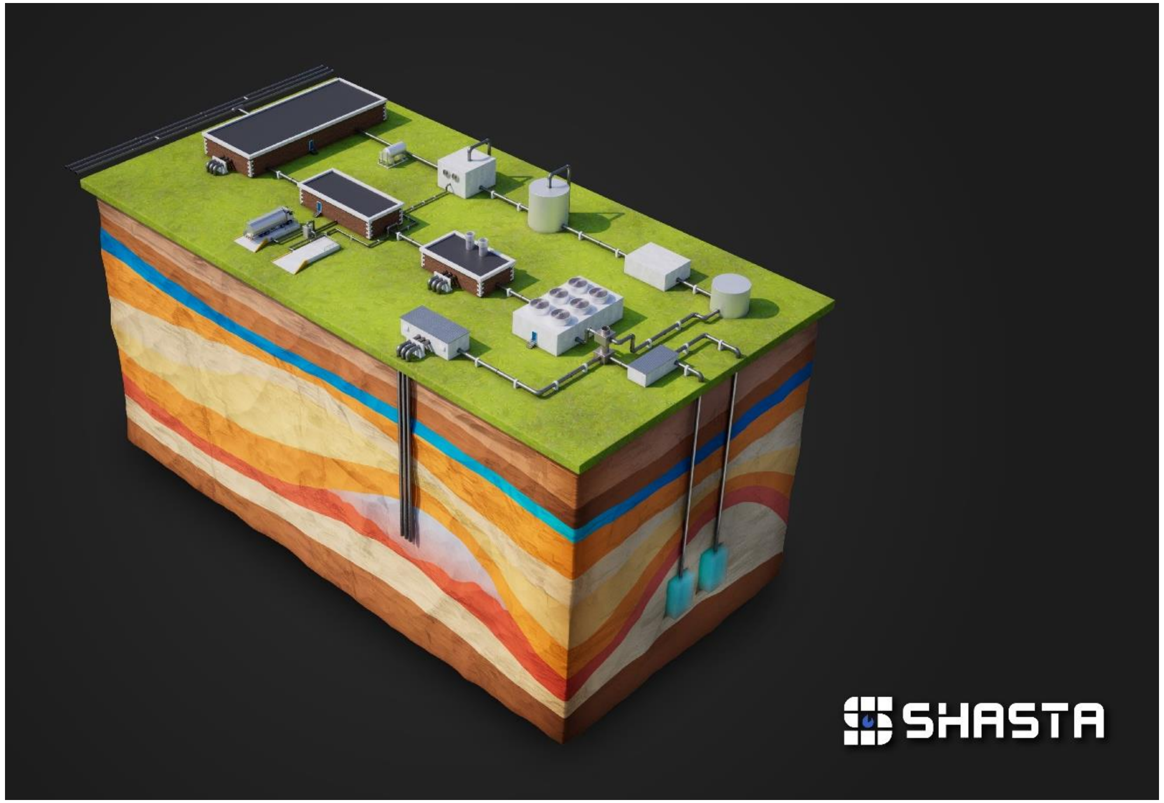
- Leverage expertise at the U.S. Department of Energy's (DOE) National Laboratory system through the ***Office of Fossil Energy and Carbon Management (FECM)*** funded Subsurface Hydrogen Assessment Storage & Technology Acceleration (SHASTA) project to provide DOT-PHMSA with the scientific basis to support 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_2

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_2** 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_2 storage
  - TEA analysis and comparison with other technologies

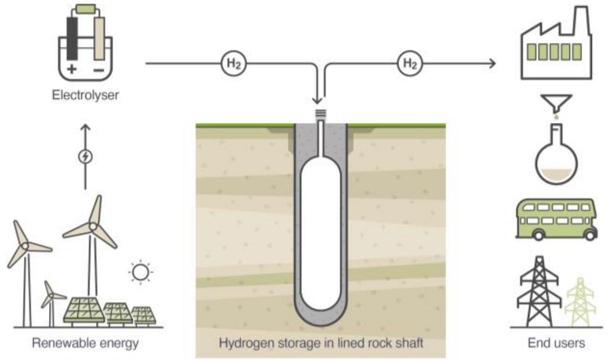
TA063

Engineered Subsurface Bulk Hydrogen Storage Demonstration

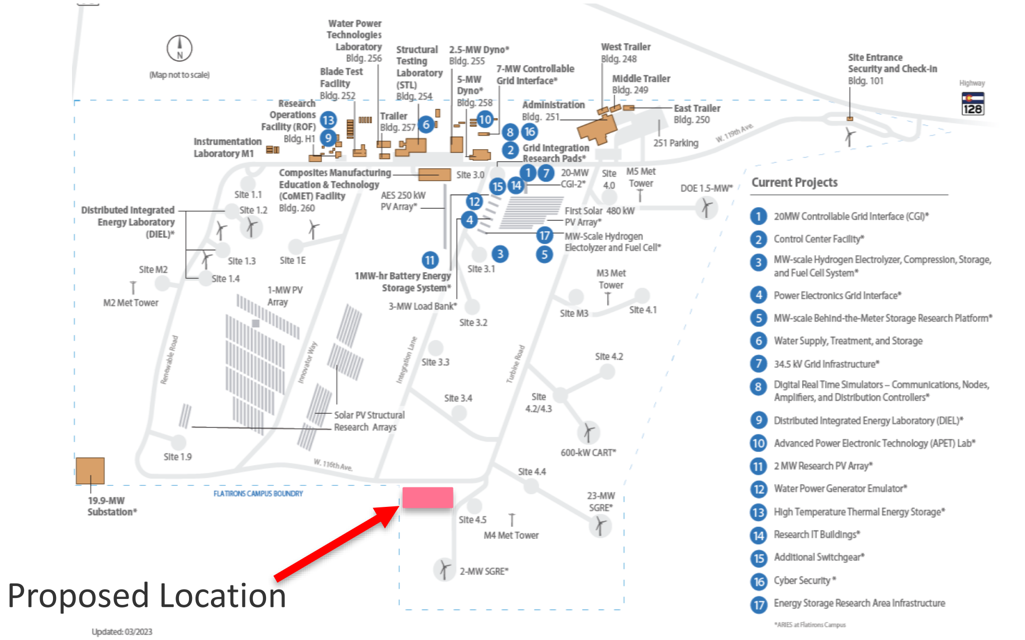
- **Scope:** Expanded at-scale H_2 storage (10 metric tonnes) at NRELs Flatirons Campus to support increased hydrogen production (5^+ MW electrolysis) and other planned hydrogen potential end use demonstrations (e.g. grid storage, HD vehicle fueling, power generation, SAF, green steel, ammonia, etc.)

- **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

Clean Hydrogen Production and End Uses



NREL's Flatirons Campus



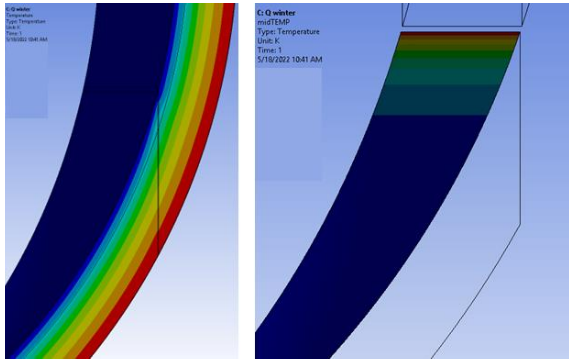
Commercial-Scale Liquid H_2 Energy Storage for International Trade

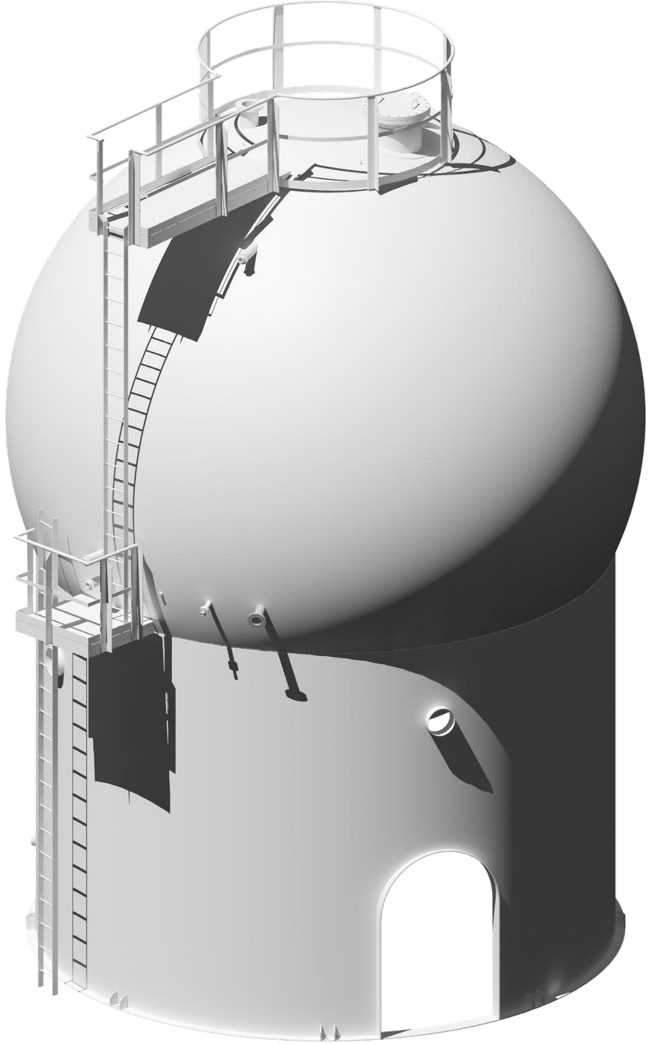
- First-of-its-kind, affordable tank design for large-scale LH_2 storage
- Storage capacity: 20,000 m^3 – 100,000 m^3 (1420 – 7100 tons)
- Double-walled, insulated tank (non-vacuum insulation system)

Status/accomplishments:

- Validation experiments complete on CS-900 cryostat, will support continued verification of tank performance modeling
- 20 m^3 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 LH2

3D thermo-mechanical tank model to predict temperature profiles and expected boil-off rate





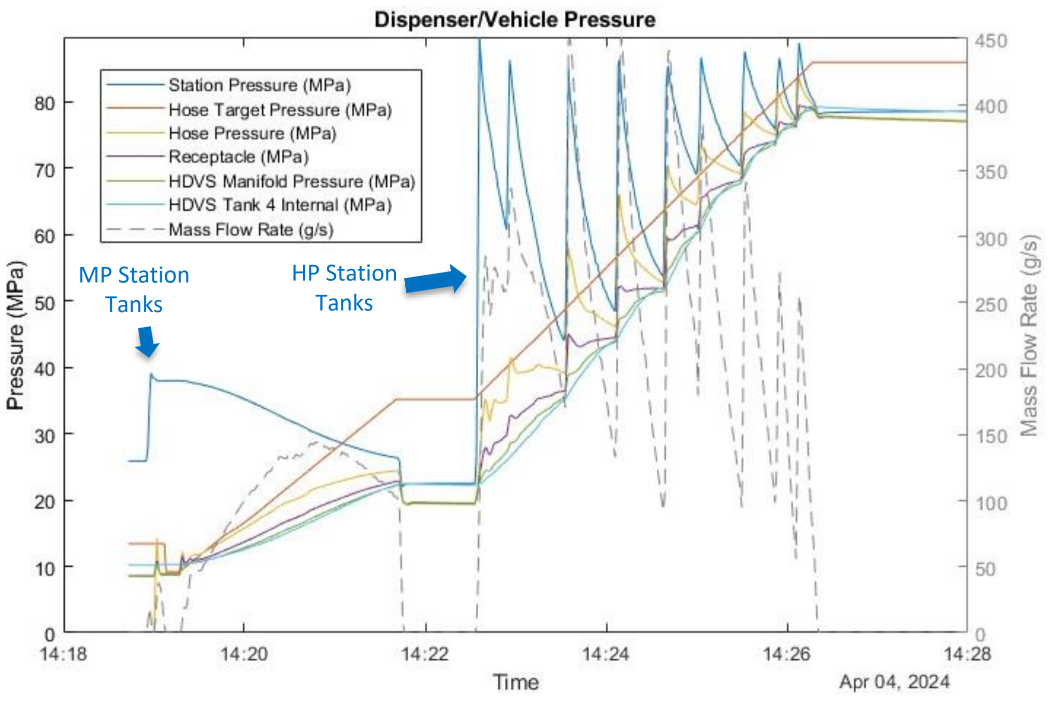
ST241

Example Supported Project Activities:

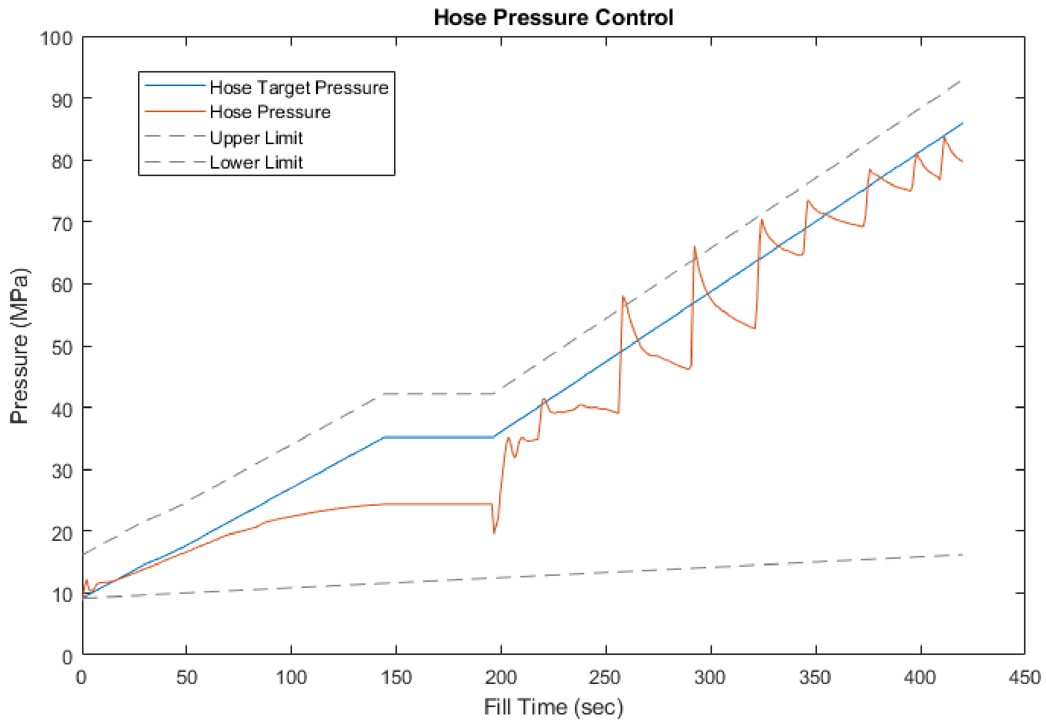
Key Projects

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

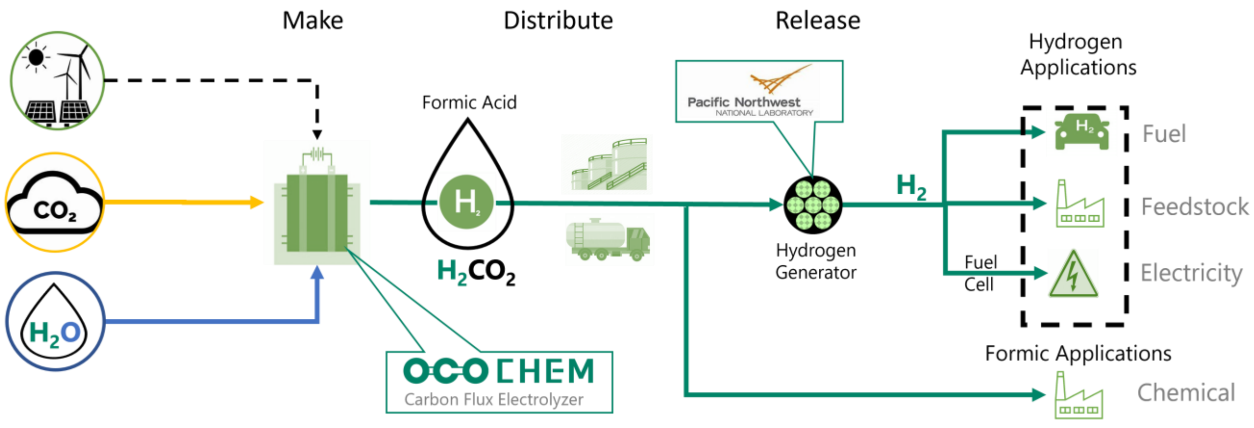
SCS031

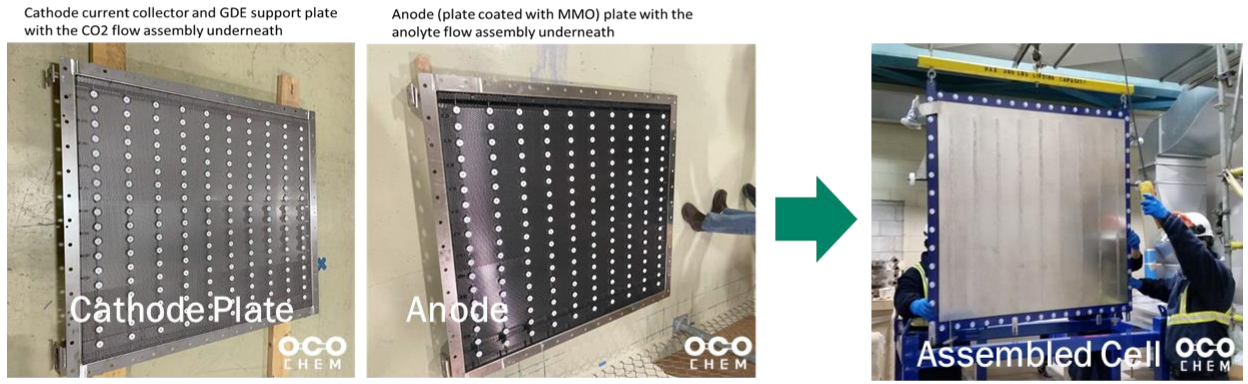
Hydrogen Carriers – Formic Acid

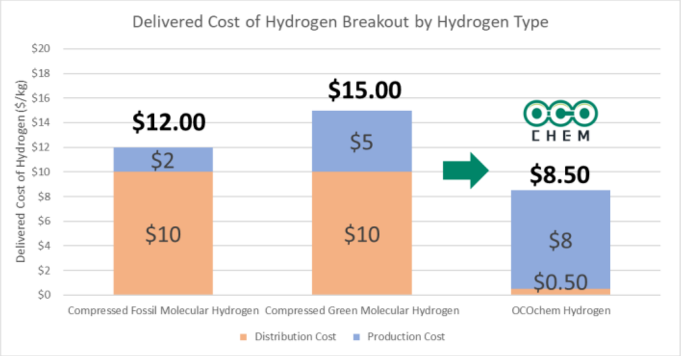
Formic Acid-based Hydrogen Energy Production and Distribution System (Formic HEPADS)

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_2-Formate electrolyzer for **green H_2** infrastructure
  - Methodically scale and optimize formate technology
  - Validate performance: Rates, purity, efficiency
  - Validate favorable techno-economics







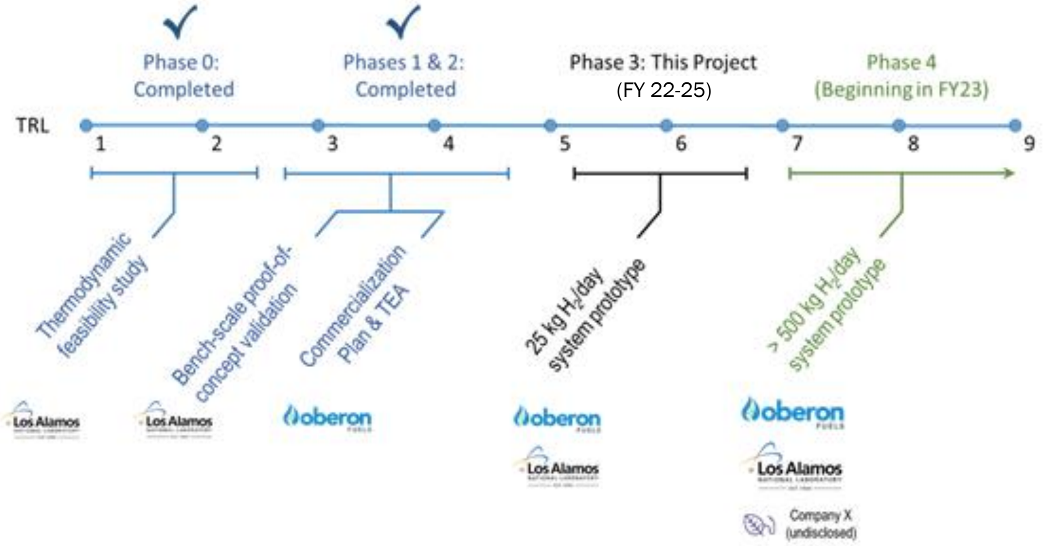
ST247

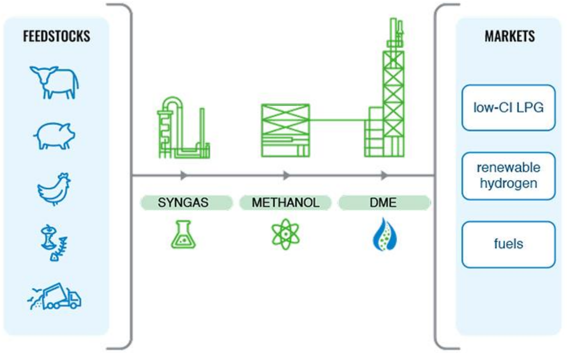
Hydrogen Carriers – Dimethyl Ether

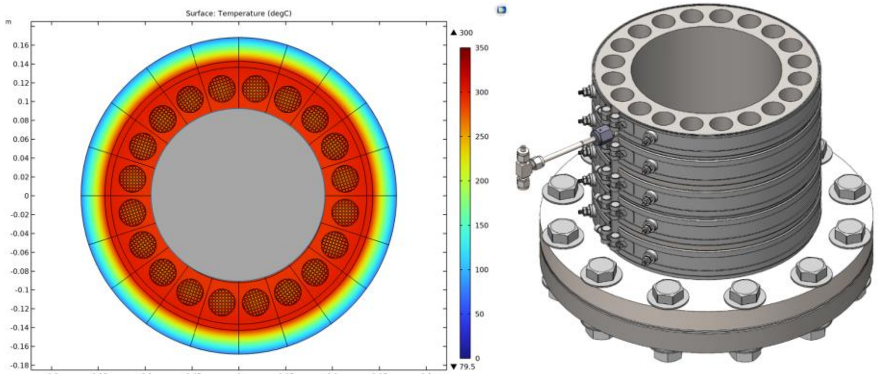
DME as a Renewable Hydrogen Carrier: Innovative Approach to Renewable Hydrogen Production

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_2
  - Validate H2 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

Low-Cost Carbon Fiber and Tanks

High-tensile-strength carbon fiber is the largest cost contributor to H_2 tanks

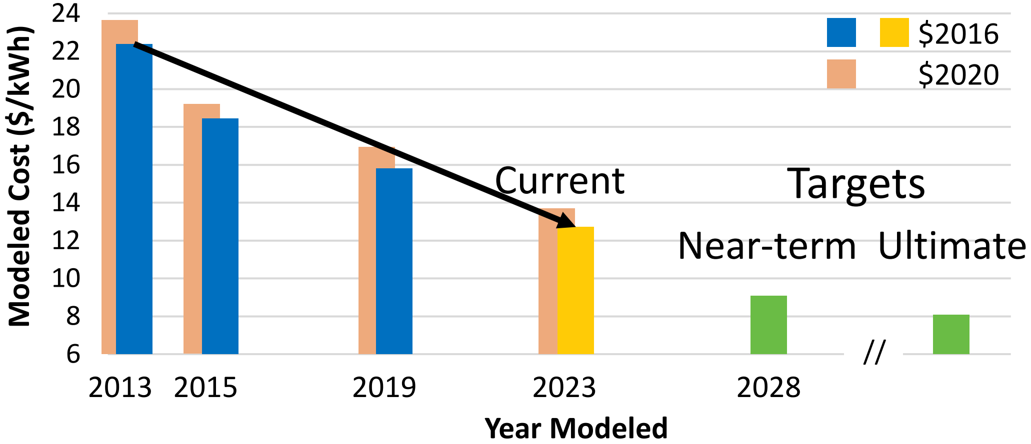
Hexagon-led project downselected to Phase II

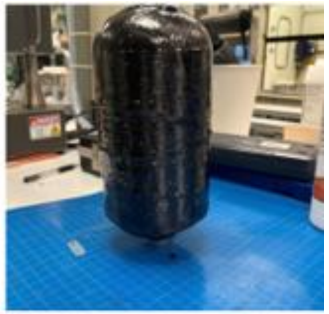
- Effort targeted 50% reduction in CF contribution to tank costs

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





Subscale test vessel (w/ commercial fibers)

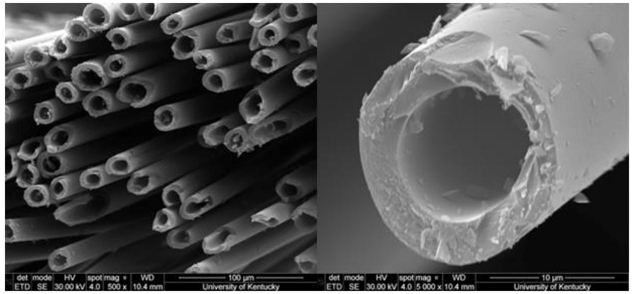
Reclaimed carbon fiber spool

ST237

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



AMR Schedule

H_2 Infrastructure Technologies Session Schedule

DOE Hydrogen Program 2024 AMR Preliminary Program-at-a-Glance

Tuesday, May 7

Room	Hydrogen Production Technologies (Regency E)	Hydrogen Infrastructure Technologies (Regency AB)	Fuel Cell Technologies (Potomac III-VI)	Systems Development and Integration (Regency CD)	Analysis, Codes and Standards (Regency F)	Intra-Agency Activities (Washington)
8:00 AM			Continental Breakfast			
8:30 AM						
9:00 AM	P000	IN000	FC000	SDI000	SA-SCS000	FE000
9:30 AM	ELY-BIL001	IN025	FC160	TA056	SA187	FE001
10:00 AM	SDI006	H2041		TA057	SA188	FE005
10:30 AM			Break			
11:00 AM	P148	IN039	FC339	TA058	SA178	FE003
11:30 AM		IN001a		SCS031	SA174	FE004
12:00 PM		IN001b			SA181	FE016
12:30 PM			Lunch (provided)			
1:45 PM	P196	IN021	FC353	TA016	SCS019	FE002
2:15 PM		IN016	FC337	TA059	SCS028	FE007
2:45 PM		IN036	FC338	TA065	SCS021	FE011
3:15 PM			Break			
3:45 PM	P204	IN015	FC349	TA001	SCS001	FE008
4:15 PM	P170	IN040	FC350	TA029	SCS011	FE010
4:45 PM	P200	IN034	FC351	TA063	SCS010	FE006
5:15 PM	P179	IN035				FE009

Wednesday, May 8

Room	Hydrogen Production Technologies (Regency E)	Hydrogen Infrastructure Technologies (Regency AB)	Fuel Cell Technologies (Potomac III-VI)	Systems Development and Integration (Regency CD)	Interagency Activities (Regency F)	Intra-Agency Activities (Washington)
8:00 AM			Continental Breakfast			
8:30 AM		IA013				
9:00 AM	P216	SCS037	FC352	TA048	IA001	
9:30 AM	P218	IN043	FC363	TA037	IA002	JO000
10:00 AM	P209	SCS042	FC327	TA030	IA003	VTO000 WPTO000
10:30 AM			Break			
11:00 AM	P213	ST127	FC336	TA062	IA004 IA005	BETO000
11:30 AM	P214		FC344	SDI002	IA006 IA007	WETO000 SETO000
12:00 PM	P215	ST209	FC345	SDI001	IA008 IA009	NE000
12:30 PM			Lunch (provided)			
1:45 PM	P208	ST212	FC348	TA018/SDI004	IA010 IA011	BES000 EJE000
2:15 PM	P210	ST213	FC347	TA028	IA012 TA009	AMMTO000
2:45 PM	P212	ST217	FC346	TA039		IED000 MESC000
3:15 PM			Break			
3:45 PM	P211	ST218	MNF-BIL001	NE001		OTT000
4:15 PM	P217	ST234		TA044		ARPAE000
4:45 PM	P205	ST242	FC354	TA051/TA060		EIA000
5:15 PM	P206	ST243		TA064		

Thursday, May 9

Room	Hydrogen Infrastructure Technologies (Regency AB)	Fuel Cell Technologies (Potomac III-VI)	Systems Development and Integration (Regency CD)
8:00 AM	Continental Breakfast		
8:30 AM	ST237		
9:00 AM	ST241	FC331	TA053
9:30 AM	ST001	FC330	TA052
10:00 AM	ST235	FC355	
10:30 AM	Break		
11:00 AM	OCED001		
11:30 AM	OCED002		
12:00 PM	OCED003		
12:30 PM	Lunch (provided)		
1:45 PM	OCED004		
2:15 PM	OCED005		
2:45 PM	OCED006		
3:15 PM	OCED007		
3:45 PM			
4:15 PM			
4:45 PM			
5:15 PM			

H_2 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_2 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!**

EERE CAREER HOME PAGE

bit.ly/DOE_EERE

EERE Career News Letter

bit.ly/EERE-career-news

Thank You

Ned T. Stetson, Ph.D.
Program Manager, Hydrogen Infrastructure Technologies
Hydrogen and Fuel Cell Technologies Office
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy
ned.Stetson@ee.doe.gov

www.energy.gov/fuelcells
www.hydrogen.energy.gov