



## UNITED STATES OF HYDROGEN

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## Alabama

### DEPLOYMENT: Birmingham, AL

Air Liquide is building and operating a hydrogen fueling station in Birmingham [READ MORE »](#)

UAB developed a hydrogen-fuel-cell bus operated in Birmingham-Jefferson County [READ MORE »](#)

### DEPLOYMENT: Montgomery, AL

Alabama State University currently has the world’s first hydrogen fuel cell sport utility vehicle, the Hyundai NEXO [READ MORE »](#)

Hyundai Motor Group building electric vehicles including hydrogen refueling stations as part of \$7.4 B investment, some made in Montgomery [READ MORE »](#)

## DEPLOYMENT: Opelika, AL

Hanwha Cimarron is building a manufacturing plant for its carbon fiber-wrapped hydrogen storage tanks in the Northeast Opelika Industrial Park

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## DEPLOYMENT: Theodore, AL

Chart Industries producing bulk hydrogen storage tanks in Mobile County

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## DEPLOYMENT: Tuscaloosa, AL

Mercedes-Benz utilizing Plug Power at Tuscaloosa, AL plant

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## DEPLOYMENT: Tuscaloosa, AL

University of Alabama granted DOE grant for advancing hydrogen gas turbines for use in electricity generation

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## Alaska

### DEPLOYMENT: Anchorage, AK

Universal Hydrogen signed a letter of intent (LOI) with Ravn Alaska, an Anchorage-based regional airline, committing to purchasing five of Universal Hydrogen's conversion kits that will integrate the company's modular hydrogen capsule technology and hydrogen powertrain into Ravn's growing regional turboprop fleet

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### OPPORTUNITY

Future Hydrogen Production in Alaska

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## Arizona

### DEPLOYMENT: Coolidge, AZ

Nikola Corp. factory in Coolidge producing electric and hydrogen powered heavy trucks

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### DEPLOYMENT: Litchfield Park, AZ

Arizona Hydrogen Manufacturing, Inc located in Litchfield Park

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### DEPLOYMENT: Palo Verde, AZ

Idaho National Laboratory is partnering with PNW Hydrogen to use a low-temperature electrolysis system to produce clean hydrogen fuel from electricity generated by the Palo Verde Generating Station. The DOE is contributing \$20 million in funding through its Earthshot Initiative

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### DEPLOYMENT: Scottsdale, AZ

United Energies Development Corporation is constructing the patented Photovoltaic and Electrolyzer hybrid facility in Scottsdale

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### RESEARCH: Scottsdale, AZ

Arizona State University: HydroGEN Seedling: Mixed Ionic Electronic Conducting Quaternary Perovskites, Materials by Design for Solar Thermochemical Hydrogen

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### RESEARCH: Tempe, AZ

Southwest Gas announced a pilot project to determine the optimal blend of hydrogen and natural gas for safety and the environment, including the physical impacts of hydrogen on distribution system infrastructure and common gas appliances

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### OPPORTUNITY

New report sees Arizona leading the way on clean energy

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Desert Mountain Energy is now offering consulting for the purpose of developing bedded and domal salt cavern hydrogen energy storage in Arizona

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## Arkansas

### RESEARCH: Fayetteville, AR

University of Arkansas researchers finding cost-effective methods for hydrogel fuel production process

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### DEPLOYMENT: Little Rock, AR

Entergy Corp. joining forces with Mitsubishi Power to integrate green hydrogen into utility business

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### RESEARCH: Lowell, AR

J.B. Hunt in Lowell testing hydrogen-fueled electric trucks produced by Navistar

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### RESEARCH: Russellville, AR

Arkansas Tech University conducting an experimental investigation of a hydrogen fuel cell engine in a lightweight vehicle

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## California

### DEPLOYMENT: Alameda, CA

First commercial hydrogen ferry in production in Alameda

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### RESEARCH: Berkeley, CA

Lawrence Berkeley National Laboratory: Lab Call FY18 (Membrane): Stable Alkaline Membrane Based on Proazaphosphatranes Organic Super Base

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Lawrence Berkeley National Laboratory: Lab Call FY18 (Reversible Fuel Cell): Technology-Enabling Materials, Cell Design for Reversible Proton Exchange Membrane Fuel Cells

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Lawrence Berkeley National Laboratory: Novel Bifunctional Electrocatalysts, Supports, and Membranes for High Performing and Durable Unitized Regenerative Fuel Cells

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Lawrence Berkeley National Laboratory: Integrated Systems Modeling of the Interactions between Stationary Hydrogen, Vehicle, and Grid Resources

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Lawrence Berkeley National Laboratory: Integrated Systems Modeling of the Interactions between Stationary Hydrogen, Vehicle, and Grid Resources

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## DEPLOYMENT: Borrego Springs, CA

San Diego Gas and Electricity is piloting a project to demonstrate hydrogen's capabilities in long-duration energy storage

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## DEPLOYMENT: Downey, CA

SoCalGas and ATCO are demonstrating hydrogen-natural gas blends in a model home

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## DEPLOYMENT: Escondido, CA

San Diego Gas and Electricity is piloting the Palomar Green Hydrogen System blending hydrogen in with natural gas

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## DEPLOYMENT: Fremont, CA

EnerVenue raised \$100m to build a nickel-hydrogen battery gigafactory and is expected to start construction in 2022

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## RESEARCH: Irvine, CA

UC Irvine granted DOE grant for advancing hydrogen gas turbines for use in electricity generation

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## DEPLOYMENT: Lancaster, CA

Energy company SGH2 is bringing the world's biggest green hydrogen production facility to Lancaster

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## DEPLOYMENT: Livermore, CA

Sandia National Laboratories, National Renewable Energy Laboratory: HyMARC: A Consortium for Advancing Hydrogen Storage Materials

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## RESEARCH: Livermore, CA

Sandia National Laboratories: H-Mat Overview: Steels

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Sandia National Laboratories: Metal Hydride Compression

[READ MORE »](#)

Sandia National Laboratories: Maritime Fuel Cell Generator Project

[READ MORE »](#)

Sandia National Laboratories: R&D for Safety, Codes and Standards: Materials and Components Compatibility

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Sandia National Laboratories: R&D for Safety, Codes and Standards: Hydrogen Behavior

[READ MORE »](#)

Lawrence Livermore National Laboratory: Molten Hydroxide Dual-Phase Membranes for Intermediate Temperature Anion Exchange Membrane Fuel Cells

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## DEPLOYMENT: Port of Long Beach, CA

Toyota builds first 100% renewable power and hydrogen generation station at Port of Long Beach

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Toyota Motor North America will build the world's first megawatt-scale carbonate fuel cell power generation plant to support its operations at the Port of Long Beach

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## DEPLOYMENT: Los Angeles, CA

HyDeal LA, initiative to achieve at-scale green hydrogen procurement at \$1.50/kg in LA Basin by 2030

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SoCalGas partnering with H2U Technologies to evaluate cost reduction of green hydrogen production in commercial settings

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Zero- and Near Zero- Emission Freight Facilities Shore to Shore Project

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LADWP embarks on hydrogen generation project

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Port of Los Angeles has two hydrogen refueling station and 12-month demonstration contract with Toyota zero-emission Class 8 hydrogen fuel cell trucks as part of Shore to Shore Project

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## RESEARCH: Los Angeles, CA

NewHydrogen sponsored research at UCLA into efficient hydrogen

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## DEPLOYMENT: Oakland, CA

Hyundai plans to build a hydrogen refueling station in Oakland as part of its “NorCAL ZERO” project with capacity to fuel 50 trucks back-to-back

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## DEPLOYMENT: Oceanside, CA

NCTD building hydrogen fueling station in Oceanside

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Orange County Transportation Authority have bought hydrogen buses

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## DEPLOYMENT: Palm Springs, CA

Hydrogenics links with StratosFuel on 2.5 MW California project

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SunLine Transit Agency in Palm Spring driving hydrogen buses

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## DEPLOYMENT: Palo Alto, CA

Electric Power Research Institute in Palo Alto gets award to test moving-bed gasifier to generate clean hydrogen

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## DEPLOYMENT: Pasadena, CA

Liox Power: HyMARC Seedling: Electrolyte Assisted Hydrogen Storage Reactions

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## DEPLOYMENT: Pico Rivera, CA

SoCalGas and HyET Hydrogen are field-testing technology that separates and compresses hydrogen from natural gas blends

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## DEPLOYMENT: Port Hueneme, CA

Reversible Solid Oxide Fuel Cell Demonstrated at NAVFAC EXWC at Port Hueneme

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## DEPLOYMENT: Richmond, CA

Raven SR is partnering with Republic Services waste collection on a plant to convert organic waste into 2,000 metric tons of green hydrogen, annually, opening in 2022

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## DEPLOYMENT: Sacramento, CA

Cummins Inc. opened its Hydrogen Fuel Cell Powertrain Integration Center in West Sacramento, California

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## RESEARCH: San Diego, CA

General Engineering & Research, LLC: Low-Cost Magnetocaloric Materials Discovery

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## DEPLOYMENT: Santa Barbara, CA

SunHydrogen developing technology to produce renewable hydrogen using sunlight and water

[READ MORE »](#)

## RESEARCH: Santa Clara County, CA

Stanford University: HydroGEN Seedling: Protective Catalyst Systems on III-V and Si-Based Semiconductors for Efficient, Durable Photoelectrochemical Water Splitting Devices

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## DEPLOYMENT: Santa Clarita, CA

Electricore: Innovative Advanced Hydrogen Mobile Fueler

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## DEPLOYMENT: Thousand Palms, CA

SoCalGas is partnering with Sunline Transit on “H2 SilverSTARS” to fuel hydrogen buses with hydrogen from RNG at a natural gas fueling station

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## DEPLOYMENT: Various

Overview station map of H2 fueling stations

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Hyzon Motors working with Raven SR to build waste-to-hydrogen hubs, two in California

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California is decarbonizing public transportation with a fleet of Xcelsior CHARGE H2 hydrogen fuel cell powered buses

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Hyundai’s “NorCAL ZERO” project Will deploy 30 Class 8 XCIENT Fuel Cell trucks around Northern CA, beginning in 2023

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SoCalGas, Cummins, received a DOE grant to advance hydrogen fuel cell technology for heavy-duty trucking and transit

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SoCalGas submitted initiatives to the DOE “Earthshot” program at UC Irvine, UCLA, and with the Green Hydrogen Coalition

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PowerTap Hydrogen Capital and Capstone Green Energy signed a strategic manufacturing and licensing agreement for the manufacturing of PowerTap’s third generation production and dispensing station, which will be in California

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Tersus Power is aiming to develop a new hydrogen production and dispensing system capable of supplying 1,250kg of hydrogen per day to enable the rollout of a hydrogen highway in California

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## OPPORTUNITY

California Hydrogen Coalition: Major Push For Hydrogen As Part of State’s Zero-Emission Vehicle Strategy

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California Is Trying to Jump-Start The Hydrogen Economy

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## Colorado

### DEPLOYMENT: Boulder, CO

University of Colorado Boulder: HydroGEN Seedling: Computationally Accelerated Discovery and Experimental Demonstration of High-Performance Materials for Advanced Solar Thermochemical Hydrogen Production

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### DEPLOYMENT: Denver, CO

AAA Denver is partnering with New Day Hydrogen LLC to have hydrogen-powered tow trucks and other emergency rescue vehicles in Colorado

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### DEPLOYMENT: Fort Collins, CO

Colorado State University acquires a fuel station to generate hydrogen

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### DEPLOYMENT: Golden, CO

National Renewable Energy Laboratory: Industrially Scalable Waste CO<sub>2</sub> Reduction to Useful Chemicals and Fuels

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National Renewable Energy Laboratory: BioHydrogen (BioH<sub>2</sub>) Consortium to Advance Fermentative Hydrogen Production

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National Renewable Energy Laboratory: Hydrogen Storage System Modeling: Public Access, Maintenance, and Enhancements

[READ MORE »](#)

National Renewable Energy Laboratory: HyMARC Seedling: Atomic Layer Deposition Synthesis of Novel Nanostructured Metal Borohydrides

[READ MORE »](#)

National Renewable Energy Laboratory, Sandia National Laboratories: HyMARC: A Consortium for Advancing Hydrogen Storage Materials

[READ MORE »](#)

National Renewable Energy Laboratory: Advanced Ionomers and Membrane Electrode Assemblies for Alkaline Membrane Fuel Cells

[READ MORE »](#)

National Renewable Energy Laboratory: Lab Call FY18 (Membrane): Spirocyclic Anion Exchange Membranes for Improved Performance and Durability

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National Renewable Energy Laboratory: Lab Call FY18 (Reversible Fuel Cell): Bipolar Membrane Development to Enable Regenerative Fuel Cells	<a href="#">READ MORE »</a>
National Renewable Energy Laboratory, Los Alamos National Laboratory: Membrane Working Group	<a href="#">READ MORE »</a>
National Renewable Energy Laboratory: Dispenser Reliability	<a href="#">READ MORE »</a>
National Renewable Energy Laboratory: Market Segmentation Analysis of Medium- and Heavy-Duty Trucks with a Fuel Cell Emphasis	<a href="#">READ MORE »</a>
National Renewable Energy Laboratory: H2@Scale Analysis	<a href="#">READ MORE »</a>
National Renewable Energy Laboratory: Energy Storage Analysis	<a href="#">READ MORE »</a>
National Renewable Energy Laboratory: Membrane Electrode Assembly Manufacturing R&D	<a href="#">READ MORE »</a>
National Renewable Energy Laboratory: Material-Process-Performance Relationships in Polymer Electrolyte Membrane Catalyst Inks and Coated Layers	<a href="#">READ MORE »</a>
National Renewable Energy Laboratory: Fuel Cell Bus Evaluations	<a href="#">READ MORE »</a>
National Renewable Energy Laboratory: Hydrogen Station Data Collection and Analysis	<a href="#">READ MORE »</a>
National Renewable Energy Laboratory: Optimal Stationary Fuel Cell Integration and Control (Energy Dispatch Controller)	<a href="#">READ MORE »</a>
National Renewable Energy Laboratory: H2@Scale: Experimental Characterization of Durability of	<a href="#">READ MORE »</a>
National Renewable Energy Laboratory: NREL Hydrogen Sensor Testing Laboratory	<a href="#">READ MORE »</a>
Colorado School of Mines: HydroGEN Seedling: Accelerated Discovery of Solar Thermochemical Hydrogen Production Materials via High-Throughput Computational and Experimental Methods	<a href="#">READ MORE »</a>
Advanced Electrolyzer Concepts in Dynamic Loading	<a href="#">READ MORE »</a>
<b>RESEARCH: Golden, CO</b>	
National Renewable Energy Laboratory: HydroGEN Overview: A Consortium on Advanced WaterSplitting Materials	<a href="#">READ MORE »</a>

## Connecticut

### DEPLOYMENT: Danbury, CT

Danbury manufacturer given grant to turn nuclear into hydrogen

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FuelCell Energy, Inc.: Proton-Conducting Ceramic Electrolyzers for High-Temperature Water Splitting

[READ MORE »](#)

FuelCell Energy, Inc.: Modular Solid Oxide Electrolysis Cell System for Efficient Hydrogen Production at High Current Density

[READ MORE »](#)

### DEPLOYMENT: East Hartford, CT

United Technologies Research Center: HydroGEN Seedling: Thin-Film, Metal-Supported HighPerformance, and Durable Proton-Solid Oxide Electrolyzer Cell

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United Technologies Research Center: High-Performance Polymer Electrolyte Fuel Cell Electrode Structures

[READ MORE »](#)

United Technologies Research Center: High-Performance Non-Platinum-Group-Metal Transition Metal Oxide Oxygen Reduction Reaction Catalysts of Polymer Electrolyte Membrane Fuel Cells

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### DEPLOYMENT: Hartford, CT

Two hydrogen fueling stations in Hartford and Wallingford, third opening in New Haven

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Windsor's Infinity Fuel & Hydrogen creates zero-gravity fuel cells for space, under water

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### DEPLOYMENT: Stamford, CT

Stamford Health is installing hydrogen fuel cells at two locations.

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### DEPLOYMENT: Storrs, CT

University of Connecticut: HydroGEN Seedling: Proton-Conducting Solid Oxide Electrolysis Cells for Large-Scale Hydrogen Production at Intermediate Temperatures

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**DEPLOYMENT: Wallingford, CT**

Proton Energy Systems: HydroGEN Seedling: High Efficiency Proton Exchange Membrane Water Electrolysis Enabled by Advanced Catalysts, Membranes, and Processes

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Proton Energy Systems: HydroGEN: Benc

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**OPPORTUNITY**

Avangrid proposed constructing a 20 MW electrolyzer and hydrogen storage facility for its Connecticut gas and electric utilities

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## Delaware

**DEPLOYMENT: Harrington, DE**

Xergy Inc.: Novel Non-Perfluorosulfonic Acid Proton Exchange Membrane for Fuel Cell Application

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**DEPLOYMENT: Wilmington, DE**

Versogen green hydrogen start-up based near Wilmington

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## Florida

**DEPLOYMENT: Amelia Island, FL**

Chesapeake Utilities Corp is working with Solar Turbines to explore using a blend of renewable natural gas and hydrogen to fuel an existing power plant

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## DEPLOYMENT: Juno Beach, FL

NextEra Energy is closing its last coal-fired power unity and investing in its first green hydrogen facility

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## DEPLOYMENT: Orlando, FL

University of Central Florida granted DOE grant for advancing hydrogen gas turbines for use in electricity generation

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## RESEARCH: Orlando, FL

University of Central Florida researchers designed the first nanomaterial that can be used to extract hydrogen fuel from seawater

[READ MORE »](#)

UCF scientists received an \$800,000 DOE grant to research how to implement hydrogen in modern, electricity-generating turbines, including exploring the best fuel blends and their combustion characteristics

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## DEPLOYMENT: Rockledge, FL

Mainstream Engineering : In-Line Quality Control of Polymer Electrolyte Membrane Materials

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## OPPORTUNITY

Florida Leading the Nation in Hydrogen Development

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## Georgia

### DEPLOYMENT: Atlanta, GA

Georgia Tech granted DOE grant for advancing hydrogen gas turbines for use in electricity generation

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Georgia Institute of Technology: Durable, High-Performance Unitized Reversible Fuel Cells Based on Proton Conductors

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Center for Transportation and the Environment Fuel Cell Hybrid Electric Delivery Van:

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Plug Power will invest \$84 million to build hydrogen refinery

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## OPPORTUNITY

Georgia joins the race to produce green hydrogen

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## Hawaii

### DEPLOYMENT: Honolulu, HI

Hawaii Hydrogen power park

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University of Hawaii: HydroGEN Seedling: Novel Chalcopyrites For Advanced Photoelectrochemical Water Splitting

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University of Hawaii: HyMARC Seedling: Development of Magnesium Boride Etherates as Hydrogen Storage Materials

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### RESEARCH: Honolulu, HI

Hawai'i Natural Energy Institute (HNEI) at University of Hawai'i developed patented invention that enhances longevity and performance of fuel cells

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### DEPLOYMENT: Kaliua-Konam, HI

Kaliua-Kona expecting county's first hydrogen bus

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## OPPORTUNITY

Hawaii Lawmaker Pushes Expanded Role For Hydrogen Fuel

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## Idaho

### RESEARCH: Idaho Falls, ID

Idaho National Laboratory: Dynamic Modeling and Validation of Electrolyzers in Real-Time Grid Simulation

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Idaho National Laboratory: High-Temperature Electrolysis Test Stand

[READ MORE »](#)

Bloom Energy is working with Idaho National Laboratory (INL) to independently test the use of nuclear energy to create clean hydrogen through Bloom Energy's solid oxide, high-temperature electrolyzer

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Bloom Energy working with DOE to test nuclear energy to create Hydrogen at Idaho National Laboratory

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### OPPORTUNITY

A step closer to clean hydrogen

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## Illinois

### DEPLOYMENT: Boilingbrook, IL

Hyzon Motors manufacturing key HFC components in Illinois

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### RESEARCH: Chicago, IL

Argonne National Laboratory: HydroGEN Seedling: Platinum-Group-Metal-Free Oxygen Evolution Reaction Catalysts for Proton Exchange Membrane Electrolyzers

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Argonne National Laboratory: System Analysis of Physical and Materials-Based Hydrogen Storage

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Argonne National Laboratory: Tailored High-Performance Low-Platinum-Group-Metal Alloy Cathode Catalysts

[READ MORE »](#)

Argonne National Laboratory: Lab Call FY19: Polymer Electrolyte Fuel Cell Electrode Structures with Encased Catalysts to Eliminate Ionomer Adsorption on Catalytic Sites

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Argonne National Laboratory: Analysis of Fuel Cells for Trucks

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## DEPLOYMENT: Evanston, IL

Northwestern University: HydroGEN Seedling: Degradation Characterization and Modeling of a New Solid Oxide Electrolysis Cell Utilizing Accelerated Life Testing

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Northwestern University: HydroGEN Seedling: Transformative Materials for High-Efficiency Thermochemical Production of Solar Fuels

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## RESEARCH: Evanston, IL

Northwestern University: Efficient Reversible Operation and Stability of Novel Solid Oxide Cells

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## DEPLOYMENT: Urbana, IL

Champaign-Urbana introduced its first zero-emission hydrogen fuel cell electric buses in 2021 (plus fueling stations)

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## DEPLOYMENT: Various

81 Illinois schools have hydrogen fuel cell systems donated by Ameren

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DOT deploying signs on “alternative fuel corridors” to direct to stations offering alternative fuels, including hydrogen fueling stations

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## OPPORTUNITY

IL has high concentration of steel mills, which can replace coke with green carbon to decarbonize steel making

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## Indiana

### DEPLOYMENT: Carmel, IN

Carmel retrofitting fleet vehicles with new technology that produces cleaner-burning and more fuel-efficient hydrogen energy

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## RESEARCH: Indianapolis, IN

Indiana University Purdue University Indianapolis: Mesoporous Carbon-Based Platinum-GroupMetal-Free Catalyst Membrane Electrode Assemblies

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## DEPLOYMENT: West Terre Haute, IN

Wabash Valley Resources producing hydrogen energy and capture and story in West Terre Haute

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## OPPORTUNITY

Indiana is becoming America's hydrogen innovation hub

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Indiana has high concentration of steel mills, which can replace coke with green carbon to decarbonize steel making

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## Iowa

### DEPLOYMENT: Iowa City, IA

University of Iowa scientists to develop technology to make hydrogen from sunlight and any source of water

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### OPPORTUNITY

Iowa could become hot spot for green hydrogen technology

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## Kansas

### RESEARCH: Coffeyville, KS

Global CCS Institute; Global Carbon Capture and Storage Institute Response to the National Hydrogen Strategy Issues Papers

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## DEPLOYMENT: Lawrence, KS

Avium LLC, headquartered at University of Kansas gets grant to advance technology that can broaden the popularity and ease of owning cars with hydrogen fuel cells

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## RESEARCH: Lawrence, KS

University of Kansas: Stationary Direct Methanol Fuel Cells Using Pure Methanol

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## Kentucky

### DEPLOYMENT: Calvert City, KY

Airgas builds a liquid hydrogen plant in Calvert City

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### DEPLOYMENT: Georgetown, KY

Toyota is establishing a dedicated line for hydrogen fuel cell modules at its Kentucky facility, scheduled to begin production in 2023

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### RESEARCH: Lexington, KY

University of Kentucky Center for Applied Energy Research: Precursor Processing Development for Low-Cost, High-Strength Carbon Fiber for Composite Overwrapped Pressure Vessel Applications

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## Louisiana

### DEPLOYMENT: Ascension Parish, LA

Air Products Announces \$4.5 Billion Blue Hydrogen Clean Energy Complex in Eastern Louisiana

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## DEPLOYMENT: Baton Rouge, LA

Koch Engineered Solutions developing renewable energy complex to produce green hydrogen in Baton Rouge

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Gron Fuels \$9.2 million multi-year program will produce green hydrogen, renewable diesel, sustainable aviation fuels, and bio-plastic feedstocks

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## DEPLOYMENT: Donaldsville, LA

CF Industries plans 20-MW electrolyzer to produce hydrogen in Louisiana with thyssenkrupp for Green Ammonia Project

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CF Industries Holdings Inc announces engineering and procurement contract

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## DEPLOYMENT: Geismar, LA

Praxair building one of nation's largest hydrogen plants in Louisiana

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Air Products hydrogen production facility in Geismar

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## RESEARCH: Lafayette, LA

The University of Louisiana at Lafayette was awarded a \$1 million grant from the DOE to develop high-performance metal-supported solid oxide electrolysis cells and innovative diagnostic methodologies to achieve net-zero or negative emissions and advance clean hydrogen technology

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## DEPLOYMENT: New Orleans, LA

Entergy Corp. joining forces with Mitsubishi Power to integrate green hydrogen into utility business

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A memorandum of understanding (MoU) for a methane-hydrogen fuel cell tugboat development project was signed to develop an H<sub>2</sub>-powered inland tugboat that will operate across the Port of New Orleans waterway network

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## OPPORTUNITY

Louisiana could be key player in building a hydrogen economy

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## Maine

### OPPORTUNITY

Central Maine Power (CMP) is exploring how to help advance green hydrogen consumption in existing manufacturing processes

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Renewable Hydrogen News: Power-to-Gas Mania Hits Maine

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## Maryland

### DEPLOYMENT: Various

Ally Power is raising \$40 million to build 6 hydrogen fueling stations around the DC, MD, and VA area

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## Massachusetts

### DEPLOYMENT: Boston, MA

Giner, Inc.: High-Temperature Alkaline Water Electrolysis

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Giner, Inc.: ElectroCat: Durable Mn-Based Platinum-Group-Metal-Free Catalysts for Polymer Electrolyte Membrane Fuel Cells

[READ MORE »](#)

Advent Technologies, Inc.: Facilitated Direct Liquid Fuel Cells with High-Temperature Membrane Electrode Assemblies:

[READ MORE »](#)

### RESEARCH: Boston, MA

Northeastern University: HydroGEN Seedling: Developing Novel Platinum-Group-Metal-Free Catalysts for Alkaline Hydrogen and Oxygen Evolution Reactions

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Northeastern University: Developing Platinum-Group-Metal-Free Catalysts for Oxygen Reduction Reaction in Acid: Beyond the Single Metal Site

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### DEPLOYMENT: Braintree, MA

Air Liquide opens hydrogen stations in Braintree and Mansfield

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## RESEARCH: Cambridge, MA

MIT researchers developed a model that shows hydrogen-fired power generation can be the more economical option when compared to lithium-ion batteries

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MIT researchers developed a hydrogen supply chain planning model and found that flexible scheduling for trucks and pipelines would allow them to serve as both storage and transmission

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## DEPLOYMENT: Mansfield, MA

Air Liquide opens hydrogen stations in Braintree and Mansfield

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## RESEARCH: Newton, MA

Giner ELX, Inc.: Electrochemical Compression INS GVD Corporation: Coatings for Compressor Seals

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## DEPLOYMENT: Northborough, MA

Saint-Gobain: HydroGEN Seedling: Development of Durable Materials for Cost Effective Advanced Water Splitting Utilizing All Ceramic Solid Oxide Electrolyzer Stack Technology

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## DEPLOYMENT: Rehoboth, MA

Daimler's truck division shifting towards zero-emission vehicles (think H2)

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## RESEARCH: Somerville, MA

Ivys Energy Solutions: Advancing Hydrogen Dispenser Technology by Using Innovative Intelligent Networks

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## DEPLOYMENT: Waltham, MA

Giner, Inc.: FY18 SBIR IIB: Ionomer Dispersion Impact on Advanced Fuel Cell and Electrolyzer Performance and Durability

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Giner, Inc.: High-Efficiency Reversible Alkaline Membrane Fuel Cells

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## OPPORTUNITY

Op-ed: Hydrogen is the missing piece of Mass. Clean energy economy

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## Michigan

### DEPLOYMENT: Ann Arbor, MI

University of Michigan: HyMARC Seedling: Optimized Hydrogen Adsorbents via Machine Learning and Crystal Engineering

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### RESEARCH: Ann Arbor, MI

University of Michigan: HydroGEN Seedling: Monolithically Integrated Thin-Film/Silicon Tandem Photoelectrodes for High Efficiency and Stable Photoelectrochemical Water Splitting

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### DEPLOYMENT: Brownstown, MI

Honda & GM producing advanced fuel cell systems

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### DEPLOYMENT: Detroit, MI

General Motors: Highly Accessible Catalysts for Durable High-Power Performance

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General Motors: Durable High-Power Membrane Electrode Assemblies with Low Platinum Loading

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### DEPLOYMENT: Southfield, MI

DTE opens hydrogen technology park in Southfield

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### DEPLOYMENT: Wayne, MI



Ford Motor Company: Vapor Deposition Process for Engineering of Dispersed Polymer Electrolyte Membrane Fuel Cell Oxygen Reduction Reaction Pt/NbOx/C Catalysts

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## DEPLOYMENT: Various

DOE is working with Michigan Economic Development Corp to enhance R&D and provide job creation

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Michigan Department of Environment, Great Lakes, and Energy (EGLE) is offering a second round of funding for electric, hydrogen fuel cell or diesel-electric hybrid commercial and mass transit vehicles to replace older, diesel-fueled models

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## OPPORTUNITY

DOE is working with Michigan Economic Development Corp to enhance R&D and provide job creation

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MI has high concentration of steel mills, which can replace coke with green carbon to decarbonize steel making

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## Minnesota

### DEPLOYMENT: Maplewood, MN

3M Company: Novel Ionomers and Electrode Structures for Improved Polymer Electrolyte Membrane Fuel Cell Electrode Performance at Low Platinum Group Metal Loadings

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3M Company: Low-Cost, High-Performance Catalyst Coated Membranes for Proton Exchange Membrane Water Electrolyzers

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### RESEARCH: Maplewood, MN

3M Company: Highly Active, Durable, and Ultra-Low-Platinum-Group-Metal Nanostructured Thin Film Oxygen Reduction Reaction Catalysts and Supports

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## DEPLOYMENT: Minneapolis, MN

Construction expected next year on hydrogen production utilizing steam and water

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Centerpoint is working on a green hydrogen pilot project to blend less than 5% into existing natural gas system

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## DEPLOYMENT: Wayne, MI

Prairie Island nuclear plant will transition to producing hydrogen from water

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## OPPORTUNITY

The Natural Gas Innovation Act opens the door to establish a regulatory framework for flowing renewable natural gas, or RNG, and green hydrogen to Minnesota gas customers

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## Mississippi

### DEPLOYMENT: Renova, MS

Entergy Corp. joining forces with Mitsubishi Power to integrate green hydrogen into utility business

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### DEPLOYMENT: Various

Hy Stor Energy LP and Connor Clark & Lunn are partnering to create the Mississippi Hydrogen Hub to use arrays of solar panels to generate electricity to electrolyzers that split hydrogen from water molecules. The zero-carbon hydrogen would be stored in underground salt caverns then piped or trucked away to serve as fuel for fuel cell vehicles or be blended into natural gas systems

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## Missouri

### RESEARCH: St. Louis, MO

Washington University in St. Louis: Corrosion-Resistant Non-Carbon Electrocatalyst Supports for Polymer Electrolyte Fuel Cells

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## Montana

### OPPORTUNITY: Butte, MT

Mitsubishi proposed building a hydrogen plant that would extract hydrogen from the water in the Berkeley Pit

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### OPPORTUNITY: Butte, MT

Hydrogen projects are ripe for Montana, NorthWestern Energy

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## Nebraska

### DEPLOYMENT: Papillion, NE

Siemens Energy is providing two SGT6-5000F turbines that run on up to a 30% hydrogen blend to power Omaha Public Power District's (OPPD) new Turtle Creek Station peaking plant

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## Nevada

### RESEARCH: Henderson, NV

Southwest Gas announced a pilot project to determine the optimal blend of hydrogen and natural gas for safety and the environment, including the physical impacts of hydrogen on distribution system infrastructure and common gas appliances

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## DEPLOYMENT: North Las Vegas, NV

Air Liquide hydrogen plant expected to open early 2022 in North Las Vegas to produce hydrogen from renewable natural gas

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Air Liquide committed to producing renewable hydrogen for the West Coast mobility market with new liquid hydrogen plant

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## New Hampshire

### OPPORTUNITY

New Hampshire Could Kick Off Renewable Hydrogen Revolution

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## New Jersey

### DEPLOYMENT: Howell, NJ

New Jersey Resources Corp. is building a green hydrogen production and distribution facility

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### DEPLOYMENT: Newark, NJ

Bloom Energy operates a fuel cell production plant in Newark

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### RESEARCH: Newark, NJ

Rutgers University: HydroGEN Seedling: Best-in-Class Platinum-Group-Metal-Free Catalyst Integrated Tandem Junction Photoelectrochemical Water Splitting Devices

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### DEPLOYMENT: Princeton, NJ

TreadStone Technologies, Inc.: Novel Structured Metal Bipolar Plates for Low-Cost Manufacturing

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### DEPLOYMENT: Various

SJI partnered with Atlantic Shores on a green hydrogen pilot program, which will research, monitor, and analyze the deployment of hydrogen technology and natural gas blending, expected to be fully operational in 2028

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## New Mexico

### DEPLOYMENT: Albuquerque, NM

Pajarito Powder: Active and Durable Platinum-Group-Metal-Free Cathodic Electrocatalysts for Fuel Cell Application

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BayoTech is building its first of 50 planned “hydrogen hubs”; a hydrogen dispensation station for hydrogen-powered vehicles expected to be operational by summer 2022:

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### RESEARCH: Albuquerque, NM

Sandia National Laboratories: Lab Call FY19: Electrode Ionomers for High Temperature Fuel Cells

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Sandia National Laboratories: Hydrogen Stations for Urban Sites

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Sandia National Laboratories: Hydrogen Quantitative Risk Assessment

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### RESEARCH: Los Alamos, NM

Los Alamos National Laboratory: Lab Call FY18 (Reversible Fuel Cell): Microstructured Electrodes and Diffusion Layers for Enhanced Transport in Reversible Fuel Cells

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Los Alamos National Laboratory: Lab Call FY19: Low-Cost Gas Diffusion Layer Materials and Treatments for Durable High-Performance Polymer Electrolyte Membrane Fuel Cells

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Los Alamos National Laboratory: Fuel Quality Assurance R&D and Impurity Testing in Support of Codes and Standards

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### DEPLOYMENT: Prewitt, NM

Escalante H2 Power is transforming the Escalante Power Plant from coal into a hydrogen power plant

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## OPPORTUNITY

New Mexico's oil and gas regions could become leaders in hydrogen power, congresspeople say

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Northwest New Mexico seeks to become hydrogen hub

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## New York

### DEPLOYMENT: Brentwood, NY

NY invests in green hydrogen demonstration project at Brentwood Power Plant on Long Island

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### DEPLOYMENT Buffalo, NY

Plug Power moving forward with plans for a "green hydrogen" plant in Genesee County

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### DEPLOYMENT: Newburgh, NY

In Newburgh, Danskammer Energy is working with Mitsubishi Energy's Green Power project

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### DEPLOYMENT: Capital Region, NY

National Grid and Standard Hydrogen are awaiting regulatory approval for their Energy Transfer System hydrogen infrastructure

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### DEPLOYMENT: Niagara Falls, NY

Linde will construct a proton exchange membrane (PEM) electrolyser plant in Niagara Falls that will produce green hydrogen on a commercial scale, expected to be operational in 2023

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## OPPORTUNITY: Oswego, NY

The U.S. Department of Energy awarded Exelon Generation a grant to explore the potential benefits of on-site H<sub>2</sub> production at the Nine Mile Point Nuclear Station in Oswego, New York

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## OPPORTUNITY: Rochester, NY

Avangrid proposed utilizing hydrogen for transportation and is assessing opportunities to construct a multi-use hydrogen production and distribution facility

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## RESEARCH: Troy, NY

Rensselaer Polytechnic Institute: Cyclic Olefin Copolymer-Based Alkaline Exchange Polymers and Reinforced Membranes

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## RESEARCH: Upton, NY

Brookhaven National Laboratory: Platinum Monolayer Electrocatalyst

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## DEPLOYMENT: Various

McDermott International's CB&I Storage Solutions and New Energy Development Company completed engineering for two 50-MW energy projects that can each produce nearly 24,000 kg/day of renewable hydrogen

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## OPPORTUNITY

Hydrogen heats up in New York

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New York is considering a program to develop resources like hydrogen and biomethane, as well as fuel cells and natural gas paired with carbon capture systems, at scale

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New York released an Initial Draft Scoping Plan that outlines how the state can achieve its ambitious emissions reduction mandates. The plan states that "Across all modeled pathways, New York's hydrogen demand is met with green hydrogen

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## North Carolina

### OPPORTUNITY

Dominion Energy is analyzing which of their two North Carolina training facilities (Gastonia and Cary) will run a pilot project to advance how hydrogen can be used as a clean energy source

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## North Dakota

### DEPLOYMENT: Beulah, ND

Bakken Energy and Mitsubishi Power Establish Clean Hydrogen Partnership

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### DEPLOYMENT: Various

Bakken Energy and Mitsubishi Power creating world-class clean hydrogen hub in North Dakota

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### OPPORTUNITY

North Dakota could be largest, lowest cost producer of blue hydrogen in North America

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## Ohio

### DEPLOYMENT: Canton, OH

Canton Ohio public transit has 14 hydrogen buses in their fleet, and a fueling station

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### DEPLOYMENT: Columbus, OH

Ohio State University granted DOE grant for advancing hydrogen gas turbines for use in electricity generation

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pH Matter LLC: FY18 SBIR Phase II Release 1: Multi-Functional Catalyst Support

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### RESEARCH: Columbus, OH



DNV opened a dedicated hydrogen testing and research laboratory in their materials performance and testing laboratory that aims to quantify the performance of materials used within hydrogen transportation and storage

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## DEPLOYMENT: Monroe County, OH

Long Ridge Energy Terminal announced plans to transition its 538 MW combined-cycle power plant to run-on carbon-free hydrogen

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## OPPORTUNITY

Ohio has high concentration of steel mills, which can replace coke with green carbon to decarbonize steel making

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## Oklahoma

### DEPLOYMENT: Ardmore, OK

Australian energy company Woodside has secured a lease and an option to purchase land at the Westport Industrial Park in Ardmore, Oklahoma, to build an initial 290MW hydrogen facility that could be expanded up to 550MW in the future

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## OPPORTUNITY

Energy Secretary hopes to make Oklahoma 'epicenter' of hydrogen fuel industry

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The Oklahoma Hydrogen Production, Transportation, and Infrastructure Task Force (OK H2 Task Force) report details Oklahoma's strong potential in hydrogen

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## Oregon

### RESEARCH: Corvallis, OR

Oregon State University: Novel Hybrid Microbial Electrochemical System for Efficient Hydrogen Generation from Biomass

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## DEPLOYMENT: Eugene, OR

Northwest Natural Holding Co. is building a 2-MW to 10-MW green hydrogen production facility

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## OPPORTUNITY: Klamath, OR

Avangrid proposed the colocation of green hydrogen production at Avangrid Renewables' Klamath Cogeneration Plant

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## Pennsylvania

### DEPLOYMENT: Clinton County, PA

Keystate to Zero proposed hydrogen gas production plant in Clinton County, PA slated to begin in 2023, awaiting permits and funding

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### DEPLOYMENT: Lancaster, PA

Pennsylvania's first green hydrogen plant planned for Lancaster County

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### RESEARCH: Philadelphia, PA

Drexel University: Polymerized Ionic Liquid Block Copolymer/Ionic Liquid Composite Ionomers for High Current Density Performance

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### DEPLOYMENT: Pittsburgh, PA

The first battery-electric freight train, the FLXdrive, reduces fuel consumption by 11% and can cut 300 million tons of emissions per year

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### RESEARCH: Pittsburgh, PA

Carnegie Mellon University: ElectroCat: Advanced Platinum-Group-Metal-Free Cathode Engineering for High Power Density and Durability

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## RESEARCH: State College, PA

Pennsylvania State University: Developing a New Polyolefin Precursor for Low-Cost, High-Strength Carbon Fiber

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Pennsylvania State University: Advanced Anion Exchange Membranes with Tunable Water Transport for Platinum-Group-Metal-Free Anion Exchange Membrane Fuel Cells

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## OPPORTUNITY

Why Pennsylvania could be poised for a new wave of energy leadership with hydrogen

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## Rhode Island

### RESEARCH: Narragansett, RI

University of Rhode Island researchers found that when producing hydrogen from seawater, sediment in the water made the production process more effective

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### DEPLOYMENT: Providence, RI

Air Liquide built one hydrogen fueling station, with plans for more

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## South Carolina

### DEPLOYMENT: Aiken County, SC

Greenway Energy, LLC: ElectroCat: Platinum-Group-Metal-Free Engineered Framework NanoStructure Catalysts

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### RESEARCH: Clemson, SC

Clemson University: Laser 3-D Printing of Highly Compacted Protonic Ceramic Electrolyzer Stack

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## OPPORTUNITY

Duke Energy filed plans to retire coal power plants and replace them with natural gas-fired plants that will use a minimum 30% hydrogen blend, with plans to shift to 100% hydrogen by 2030

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## Tennessee

### DEPLOYMENT: Charleston, TN

Plug Power hydrogen plant generates 6.4 tons of hydrogen daily

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### DEPLOYMENT: East TN

A collaborative project between Southern Co. Gas, Electro-Active Technologies, and T2M Global to advance tech for producing clean hydrogen from waste was funded by the DOE

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### RESEARCH: Nashville, TN

Vanderbilt University: Fuel Cell Membrane Electrode Assemblies with Platinum-Group-Metal-Free Nanofiber Cathodes

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Vanderbilt University: Composite Polymer Electrolyte Membranes from Electrospun Crosslinkable Poly(Phenylene Sulfonic Acid)s

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### RESEARCH: Oak Ridge, TN

Oak Ridge National Laboratory: Novel Plasticized Melt Spinning Process of Polyacrylonitrile Fibers Based on Task-Specific Ionic Liquids

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## Texas

### DEPLOYMENT: Austin, TX

H2@Scale Project Launched in Texas

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## RESEARCH: Austin, TX

Researchers at UT created a framework to integrate hydrogen gas into existing US infrastructure

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## OPPORTUNITY: Bridge City, TX

Entergy proposed building a 1,215-megawatt (MW) hydrogen power plant

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## OPPORTUNITY: Corpus Christi, TX

Avangrid Renewables identified an opportunity for an electrolysis project to convert wind power into green hydrogen and ultimately into green ammonia

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## DEPLOYMENT: Dallas, TX

Home Depot opens automated Dallas fulfillment center with hydrogen-powered forklifts

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## DEPLOYMENT: El Paso, TX

El Paso Electric utilizing gas turbines that were designed to be operated on up to 100% hydrogen in the future

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## DEPLOYMENT: Houston, TX

Entergy Corp. joining forces with Mitsubishi Power to integrate green hydrogen into utility business

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## DEPLOYMENT: La Porte, TX

Linde's new plant, scheduled to start up in 2021 will produce over 30 tons per day of high purity liquid hydrogen

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## DEPLOYMENT: Port Arthur, TX

Port Arthur develops steam methane reformer hydrogen production facility

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Carbon Capture Project at Air Products' Port Arthur Hydrogen Production Facility

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## RESEARCH: San Antonio, TX

Southwest Research Institute: Hydrogen Compression Application of the Linear Motor Reciprocating Compressor

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## DEPLOYMENT: Various

Big Hill Materials plans to invest \$6-8 billion over the next 7 years on hydrogen projects including 5 natural gas/hydrogen fuel power plants with carbon capture technology, two hydrogen electrolyzers, a hydrogen and carbon blending plant, and a hydrogen fuel/natural gas/oil trading facility

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## OPPORTUNITY

Texas could become nation's leader in production of hydrogen energy

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How The Lone Star State Is Building A Green Hydrogen Future

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Texas has resources, infrastructure to become global hydrogen hub—Houston specifically

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## Utah

### DEPLOYMENT: Central UT

Mitsubishi Power and Magnum Development announced the launch of the Advanced Clean Energy Storage project

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### DEPLOYMENT: Delta, UT

Intermountain Power Agency Orders MHPS JAC Gas Turbine Technology for Renewable-Hydrogen Energy Hub in Delta

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Conversion of 1,800MW Intermountain coal plant in Utah to 840MW gas-hydrogen facility moving forward

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Mitsubishi Power and Magnum Development announced the launch of the Advanced Clean Energy Storage project

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## DEPLOYMENT: Salt Lake City, UT

Dominion has a pilot program blending 5% hydrogen into their test system at their training academy

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## DEPLOYMENT: South of Salt Lake City, UT

130 miles south of SLC engineers working on salt dome to create that will become one of the largest renewable energy reservoirs

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## DEPLOYMENT: West Valley City, UT

Grid-scale energy storage with renewable hydrogen production and utilization forms core of Advanced Clean Energy Storage project in central Utah

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## Virginia

### DEPLOYMENT: Arlington, VA

Strategic Analysis, Inc.: Analysis of Advanced Hydrogen Production Pathways

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Strategic Analysis, Inc.: Hydrogen Storage Cost Analysis

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Strategic Analysis, Inc.: Fuel Cell Systems Analysis

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### DEPLOYMENT: Chickahominy District, VA

Balico, LLC is working with Mitsubishi Energy's Green Power project

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### DEPLOYMENT: Pembroke, VA

Nanosonic, Inc.: FY17 SBIR II Release 1: Novel Hydrocarbon Ionomers for Durable Polymer Electrolyte Membranes

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NanoSonic, Inc.: Cryogenically Flexible, Low Permeability Hydrogen Delivery Hose (D)

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## Washington

### DEPLOYMENT: Bellevue, WA

Puget Sound Energy working with Mitsubishi Power to collaborate on green hydrogen storage assets

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### RESEARCH: Benton County, WA

Pacific Northwest National Laboratory: Materials Challenges for Cryogenic Hydrogen Storage Technologies

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Pacific Northwest National Laboratory: ElectroCat: Highly Active and Durable Platinum-GroupMetal-Free Oxygen Reduction Reaction Electrocatalysts through the Synergy of Active Sites

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Pacific Northwest National Laboratory: Lab Call FY19: Solid Phase Processing for Reduced Cost and Improved Efficiency of Bipolar Plates

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Pacific Northwest National Laboratory: Magnetocaloric Hydrogen Liquefaction

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Pacific Northwest National Laboratory: Hydrogen Safety Panel, Safety Knowledge Tools, and First Responder Training Resources

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Pacific Northwest National Laboratory: H-Mat Overview: Polymers

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### DEPLOYMENT: Douglas County, WA

Global technology and power solutions leader Cummins Inc. (NYSE: CMI) will provide its 5-megawatt PEM electrolyzer to enable renewable energy for the Douglas County Public Utility District

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### DEPLOYMENT: Lewis County, WA

Hydrogen fueling station planned as part of US hydrogen highway network, scheduled to open in 2022

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### OPPORTUNITY: Lewis County, WA

Lewis County Has Potential to Be First Hydrogen Valley in Pacific Northwest

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## DEPLOYMENT: Moses Lake, WA

Universal Hydrogen is working to modify a small regional turboprop aircraft to fly on hydrogen fuel, test and certify them to carry passengers, and demonstrate that hydrogen aviation is economically viable

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## RESEARCH: Quincy, WA

A project funded by the US Department of Energy's H2@Scale Initiative will explore the use of large-format hydrogen fuel cells to produce sustainable backup power for Microsoft data centres at a facility in Quincy

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## DEPLOYMENT: Seattle, WA

Alaska Airlines signs agreement for use of hydrogen and solid waste as bio fuel

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Anglo American is developing the world's largest zero-emission hydrogen-powered fuel cell mining truck in partnership with First Mode that will be used at its global mining sites.

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## RESEARCH: Seattle, WA

The Port of Seattle and Seattle City Light, assisted by Pacific Northwest National Laboratory and Sandia National Laboratories, will take a deeper look at using hydrogen fuels to reduce greenhouse gas emissions in two studies funded by \$2.12 million in Energy Department grants.

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## DEPLOYMENT: Sumner, WA

Global technology and power solutions leader Cummins inc will provide its 5-megawatt PEM electrolyzer to enable renewable energy

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## OPPORTUNITY

Renewable hydrogen could play a key role in Washington's clean-energy future

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## West Virginia

### RESEARCH: Morgantown, WV

West Virginia University: HydroGEN Seedling: Intermediate Temperature Proton-Conducting Solid Oxide Electrolysis Cells with Improved Performance and Delivery

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## Wisconsin

### OPPORTUNITY

Wisconsin Hydrogen Breakthrough May Be Steps Toward Cleaner Energy

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## Wyoming

### DEPLOYMENT: Cheyenne, WY

Bill Gates funding coal and hydrogen production facility

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### RESEARCH: Laramie, WY

University of Wyoming's School of Energy Resources partnered with The Williams Cos. Inc. on the Wyoming Hydrogen Pilot Project researching hydrogen production from renewable energy sources

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### OPPORTUNITY

The future of hydrogen energy in Wyoming: A conversation with the head of the Wyoming Energy Authority

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All Green Hydrogen Roads Lead to ... Wyoming

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Wyoming Energy Authority announced funding for three hydrogen production/use projects

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# HYDROGEN FORWARD