COLORADO HYDROGEN NETWORK

www.colorado-hydrogen.org

Monthly Meeting
20 January 2026

Agenda

- Maria DiBaise-Eisemann Retirement from the Energy Office
- Coming Events
  - ClimateCon! Denver February
  - S&P Global World Hydrogen and Carbon Conference, Houston March
  - Drilling for Hydrogen, Houston, May
- Tech Talk
  - Types of Natural Hydrogen

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Maria DiBaise-Eisemann has Retired from the Energy Office!

- Maria has enjoyed a 35-year career working in clean air, transportation, fuel and energy
- At the Colorado Energy Office, some of Maria's accomplishments include:
  - The Colorado Low Carbon Hydrogen Roadmap
  - Western Interstates Hydrogen Hub
- Before the Colorado Energy Office Maria's positions included:
  - CSU's National Center for Vehicle Emissions Control and Safety (NCVECS)
  - US Peace Corps – Philippines
  - US EPA, Office of Air Quality Planning and Standards, Headquarters
  - US DOE Clean Cities – Northern Colorado

Maria in front of the hydrogen train at the Federal Railroad Administration's Transportation Technology Center in Pueblo, CO

We all wish Maria a long, happy, healthy and prosperous retirement

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Coming Events

ClimateCon!

ClimateCon! Denver

February 2

Lowry Conference Center

1061 Akron Way, Denver

Info and registration: climatecon.world

Brian will be moderating a panel discussion on Hydrogen Transportation

Bran is also a panelist on the Ammonia as a Hydrogen Carrier panel

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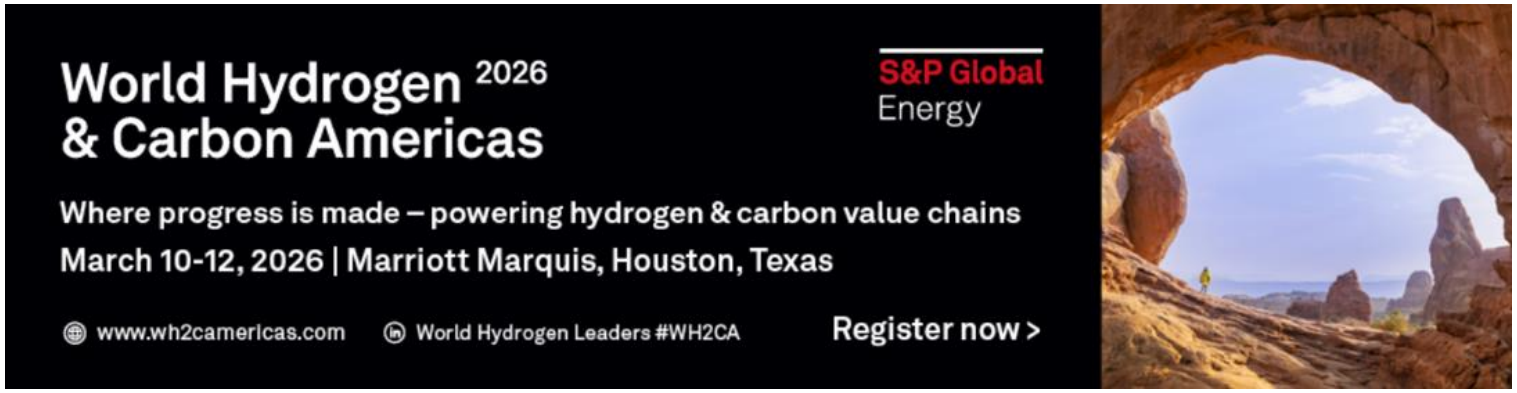
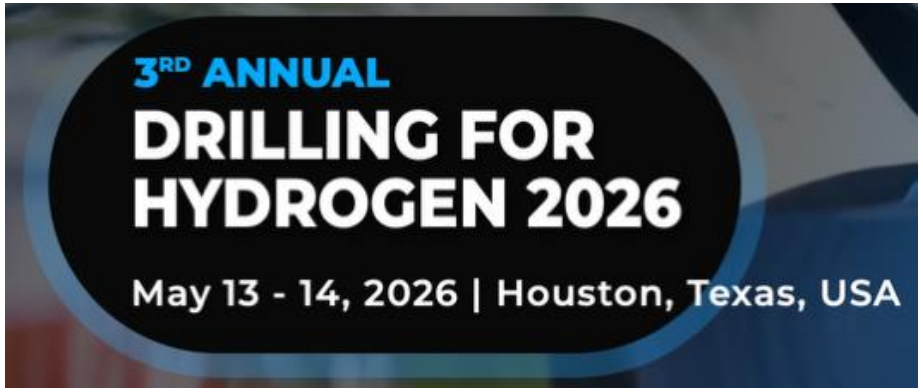
Coming Events



Brian will lead a panel discussion on Geologic Hydrogen on March 12th

www.wh2camericas.com



Drilling for Hydrogen
May 13 – 14, 2026 Houston, TX

More info and to register at:

www.drilling-for-hydrogen.com

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ClimateCon!

Sessions

- Hydrogen Vehicles
- Federal Funding
- Wildfire Prevention
- Scope 3 Emissions
- Sustainable Aviation Fuel
- Environmental Justice
- Utility Scale Solar
- Building Wellness
- Emissions
- Rebranding Air Pumps
- Reducing Transportation Emissions
- Ammonia as a Hydrogen Carrier

Also featuring lunch plus an Exhibit Hall with display booths

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Hydrogen Vehicles Panel

ClimateCon!

Introductory comments

- If it wasn't for the need to stop Climate Change – we wouldn't bother with hydrogen
- But WHY do we need hydrogen? Can't we just "electrify everything"? No, and here's why
- Electricity has very different characteristics from molecules like petroleum or hydrogen
  - Electricity takes much longer to transfer energy (like to vehicles)
  - Storing electricity in batteries is heavier and bulkier than molecules (important for trucks and aircraft)
  - We need molecules for the chemical properties like making fertilizer and removing the oxygen from iron ore to make steel
  - Powering Data Centers with Geologic Hydrogen can provide both power and cooling-water taking the burden off the electric grid and water supply

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Hydrogen Transportation Panelists

Frank Bruno
CEO of Via Mobility
Transit company

Ronald Bain
Owner of KeeVac
Industrial vacuum truck manufacturer

Buford Barr
COO New Day Hydrogen
Hydrogen fuel station supplier

KeeVac Truck Examples

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Via Mobility Vehicle Examples

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Geologic Hydrogen

Geologic Hydrogen

From the movie “The Graduate” 1967

“Let me give you a word of advice:

It’s ~~plastics~~ Geo Hydrogen my boy, ~~plastics~~ Geo Hydrogen”

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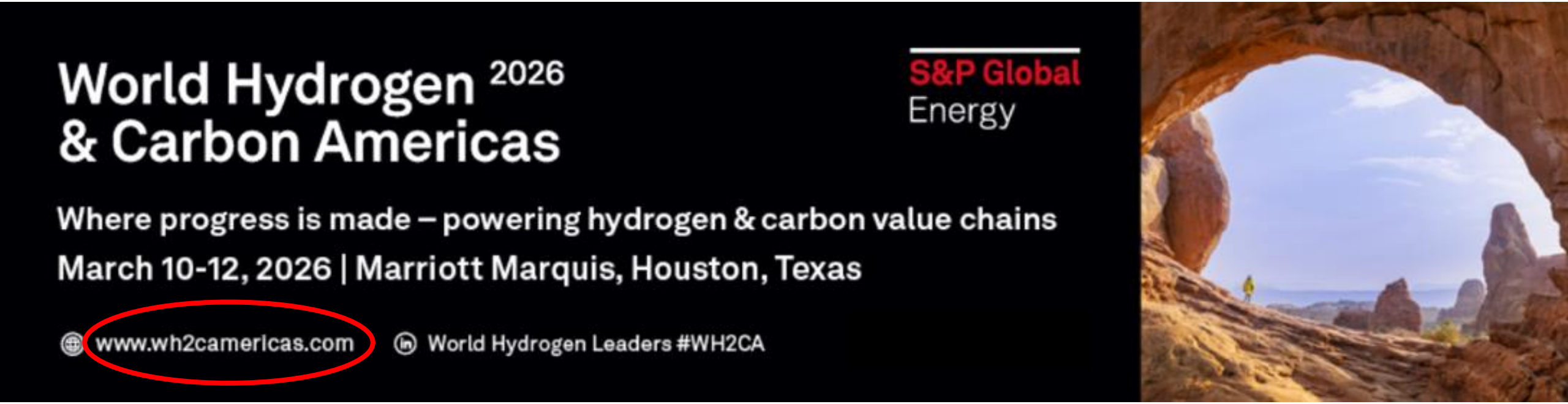
Hydrogen Conference, Houston, March 10-12



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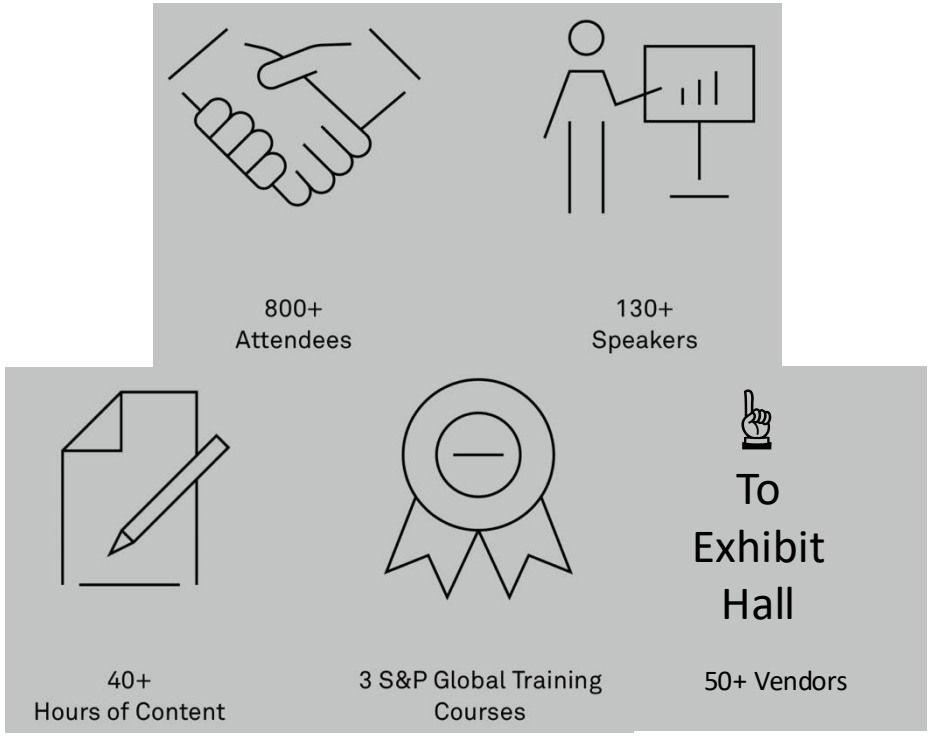
World Hydrogen Agenda at a Glance

Featuring:



World Hydrogen & Carbon Americas Main Conference Day One 11th March		
Carbon and Hydrogen Landscape in Americas		
Understanding Clean Energy Demand		
Networking Break		
Scaling Hydrogen and Carbon Projects		
Data Center Opportunity		
Networking Lunch Break		
Hydrogen	**Carbon**	**Feedstocks & Fuels (Ammonia, Methanol, SAF, e-fuels)**
H2s Role in Energy Mix	Industries Driving CCUS Growth	H2 Derivative Pathways
Delivering H2 Projects	CCUS & Thermal Plants	Ammonia Synthesis
State Level Incentives	Technology Innovation	Growing SAF Market
Project Efficiency	CO2 Purity	Clean Ammonia
Networking Break		
Steel in the ground	BECCS and Biochar	Waste-to-Hydrogen
Driving Down Cost	Methane Management	Infrastructure for Low-Carbon Fuel Market
Networking Drinks		

World Hydrogen & Carbon Americas Main Conference Day Two 12th March	
Networking Breakfast / Interactive Discussion Groups	
Hydrogen	**Carbon**
H2 Export & Global Trade	CO2 Hubs
Port Infrastructure	Transport & Storage
Networking Break	
Securing Finance & Offtake	Carbon Markets
Driving H2 Adoption	Value of CO2
Networking Lunch	
Geological Hydrogen	
Navigating the Path Ahead	
Close of Conference	

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Geologic Hydrogen Panelists

- Clean Hydrogen from disused oil wells
  - ProtonH2 (oxygen injection)
  - Eclipse Energy (microbe injection)
- Natural Hydrogen
  - Possibly geo kiln
- Natural Hydrogen prospectivity – (Possibly the USGS)
- Hydrogen market data and analysis tools (TBD)

Geologic Hydrogen Panel - Intro

- There are two categories of Geologic Hydrogen:
  - Clean hydrogen generated in oil reservoirs by either oxygen injection or microbe injection
  - Natural Hydrogen which can be found in underground deposits or stimulated
- The reason Geologic Hydrogen is so important is twofold:
  - First, Natural Hydrogen is thought to be more abundant than all the known natural gas reserves
  - Second, the cost is likely to be low enough to make Geologic Hydrogen competitive with natural gas and diesel – including the cost to transport it
- So why do we need hydrogen to replace natural gas, diesel and gasoline?
  - For trucking, only hydrogen can provide the high energy-density, low weight and low volume needed
  - For all vehicles, only hydrogen can provide the fast transfer of energy needed for refueling
  - For fertilizer and removing the oxygen from iron ore, we need the chemical processes that hydrogen provides
  - For data centers, hydrogen can provide both electrical energy and water for cooling, since the exhaust from fuel cells or hydrogen combustion engines is water vapor.

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Geologic Hydrogen Panel

- Intro Continued – So where does hydrogen have to be priced to compete with diesel and natural gas?
  - To replace Natural Gas $1.15 per kg delivered by pipeline
  - To replace diesel $3.50 per kg delivered by truck
  - Both of these imply 35¢ per kg at the well
- Panel questions:
  - Overview of the process to generate Clean hydrogen in oil reservoirs – and why it's a Zero GHG process. Directed to ProtonH2 and Eclipse Energy.
  - Overview of the state-of-the-art in Natural Hydrogen, both reservoirs and stimulated. Directed to GeoKiln.
  - USGS view of the Natural Hydrogen prospectivity – both predicted and data coming in from the field. Directed to the USGS
  - Data availability and Analysis tools to keep up with and understand the hydrogen market. (TBD)

Tech Talk
Natural Hydrogen

Natural (Geologic) Hydrogen

- Natural Geologic Hydrogen requires two things
  - A generation mechanism
    - Serpentinization
    - Radiolysis of water
    - Deep earth degassing
  - A trap in the geology

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Geologic Hydrogen Generation Mechanisms

- Serpentinization – Water deep underground reacts with iron-rich rocks (like olivine) to create new green minerals (serpentine), releasing heat and hydrogen gas in the process
- Radiolysis of Water – Splitting water molecules with ionizing radiation from Uranium and Thorium present in the geology
- Deep Earth Degassing – Hydrogen generated in the core of the earth rises to the surface and becomes trapped in formations.

Geologic Hydrogen Traps

- **Salt domes and bedded salt formations** - Considered ideal seals due to their extremely low permeability and ability to self-seal, which prevents hydrogen from leaking
- **Shale** – Because of its low permeability
- **Volcanic Sills and Intrusions** – Igneous rocks that intrude into other layers can act as seals for accumulating hydrogen
- **Carbonate Reservoirs** – A subsurface rock formation that stores oil, gas, or water
- **Structural Traps –** dome-shaped geological structures or structural faults that block hydrogen migration.

Natural Hydrogen Generation Can be Stimulated

- **Steam Injection** – High-pressure steam at 200–400°C is injected into iron-rich formations significantly accelerating the oxidation of iron(II) to iron(III) while reducing water into H_2 gas
- **Electrical Reservoir Stimulation (ERS)** – Low-frequency or pulsed electrical currents are applied to heat the rock and induce micro-fractures through thermal expansion and vibration. This increases the reactive surface area and speeds up reaction kinetics
- **Chemical Stimulation** – Short-chain organic acids (like acetic acid, i.e. vinegar) dissolve iron-bearing minerals and break down rock surfaces, exposing fresh reactive sites
- **Catalytic Stimulation** – Aluminosilicates like kaolinite, chlorite, and albite can initiate hydrogen generation at temperatures significantly lower than typical non-catalytic processes
- **Fracture Stimulation** – Techniques like hydraulic fracturing or cyclic pressure injection create fracture networks which allows injected water to circulate more freely across fresh mineral surfaces.

Why Geologic Hydrogen is So Important

- Cost – Geologic hydrogen can compete with natural gas and diesel
- Abundance – There is believed to be more Natural Hydrogen than all known natural gas reserves

Notional Example

Use	Hydrogen Price Target Per kg
Light-Duty Vehicles (gas)	$8.75*
Heavy-Duty Trucks (diesel)	$3.90*
Natural Gas	$1.15

* Yields same $ per mile for the user

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Why Geologic Hydrogen is So Important

- Cost – the only way for hydrogen to compete with natural gas and diesel
- Data Centers – Provides both electricity AND WATER

Notional Example

Use	Hydrogen Price Target Per kg	Geologic Hydrogen (50¢ per kg at the well)		Electrolysis
		Delivered Price By Truck (kg)	Delivered Price By Pipeline (kg)	On-Site Price (kg)
Light-Duty Vehicles (gas)	$8.75*	$3.90	–	$8.75
Heavy-Duty Trucks (diesel)	$3.90*	$3.90	–	~~$8.75~~
Natural Gas	$1.15	–	$1.15	~~$8.75~~

* Yields same $ per mile for the user

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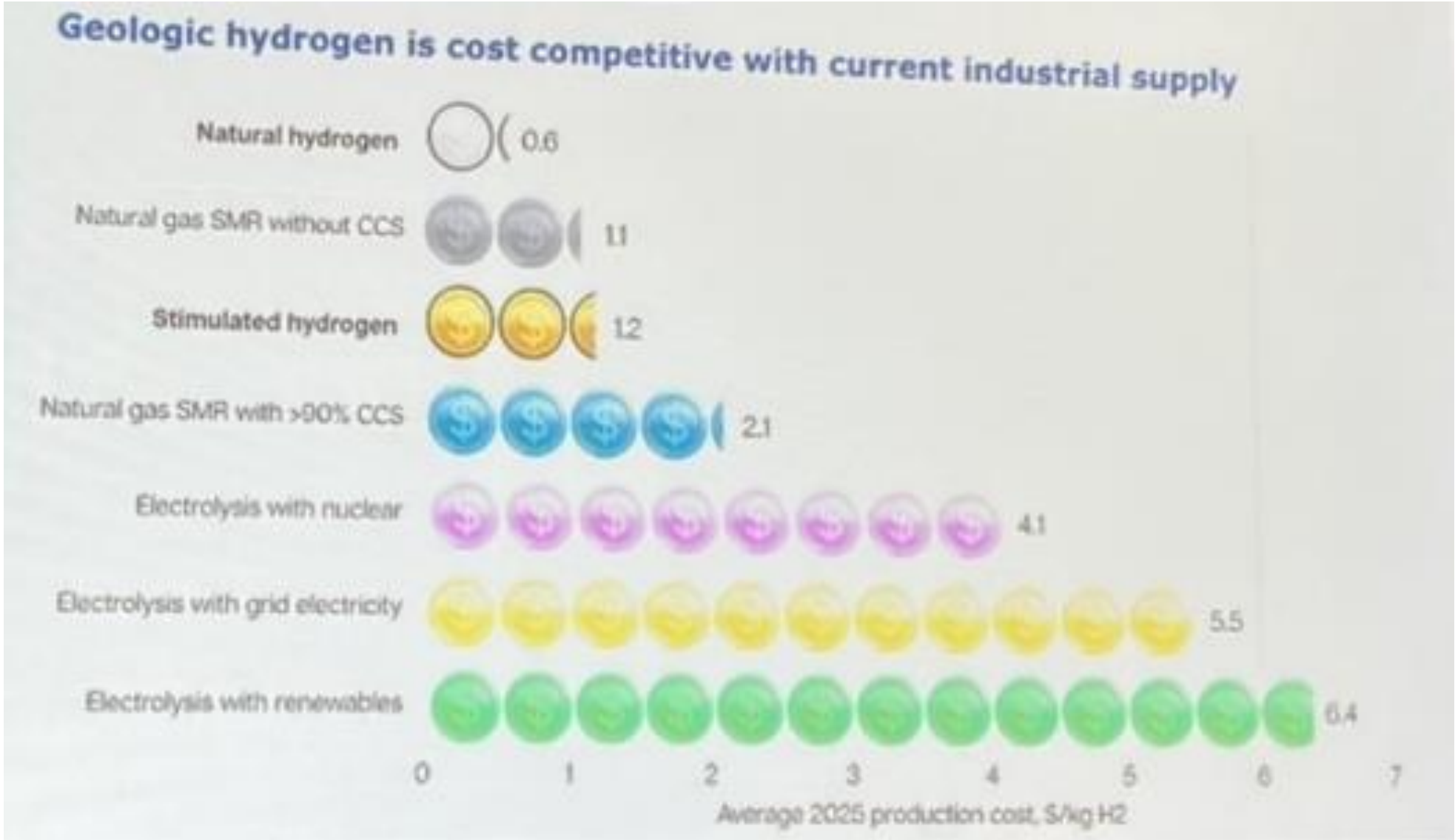
Slide from Drilling for Hydrogen Conference 2025



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CHN Natural Hydrogen – Colorado Initiative

- Presentation to OEDIT on Dec 16 and the Colorado Energy Office on Jan 12
  - To inform of the rapidly developing Natural Hydrogen ecosystem
  - Colorado's wealth of Geologic Hydrogen (Natural & from disused oil wells)
  - Cost competitiveness with natural gas and diesel – including transport
  - Applicability for Data Centers
    - Hydrogen can supply both electricity and water (for cooling)
    - Avoids burden on electric grid and water systems
    - A high-volume user to start the market
- The goal is to interest the CEO & OEDIT in promoting:
  - The development of Colorado's Geologic Hydrogen resources
  - The deployment of Data Centers in Colorado powered by Geo H_2

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HydrogenNowCast

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Podcast