

HYDROGEN FUEL CELL



PARTNERSHIP

1/9/2023

Update: Hydrogen in California

Keith Malone

San Mateo Resource Management and Climate Protection
Committee (RMCP)



North American West Coast

CA, OR, WA and BC



- Increasingly aligning and identical policies for zero-emission vehicles and hydrogen economy
 - Pacific Coast Collaborative
- Statement of Cooperation (October 6)
 - Accelerate charging and hydrogen fueling
 - Focus on I-5 corridor – San Diego to Vancouver
- Hydrogen hub efforts
 - CA – Alliance for Renewable Clean Hydrogen Energy Systems (ARCH2ES)
 - WA and OR – Pacific Northwest Hydrogen Association
 - BC - Hydrogen Changemakers Consortium – CICE

Pacific Coast
COLLABORATIVE





Key drivers of renewable hydrogen production

- Infrastructure Investment and Jobs Act (2021)
 - Clean hydrogen production – \$9.5 billion:
 - **Hydrogen hubs** - \$8 billion
 - Decrease cost of producing hydrogen with electrolyzers - \$1 billion
 - Clean hydrogen manufacturing and recycling - \$0.5 billion
- Inflation Reduction Act (2022)
 - Hydrogen Production Tax Credit

79 hub applicants
33 encouraged
April 7 submission



SHINe



Hawai'i Pacific
Hydrogen Hub





A Global Perspective



US, Canada and Mexico agree to develop 'North American clean hydrogen market'



"We are looking at the beginnings of a revolution in our energy system. And I see Europe leading that revolution. We have a perfect alignment of conditions for a new hydrogen market."

Kadri Simson
European Union
Commissioner for Energy

'Our switch to renewables and hydrogen will make us truly independent of Russia,' says European Commission President



**G7 Hydrogen
Action Pact**

"It is green hydrogen that will bring new and diverse participants to the market, diversify routes and supplies and shift power from the few to the many."

Francesco La Camera
Director-General IRENA



Hydrogen production projects in California



Yosemite Clean Energy to receive \$1 million from state of California for forest biomass to hydrogen projects

Oroville and Tuolumne, CA



California
Department of Conservation

Forest Biomass to Carbon-Negative Biofuels Pilot Program

Kore Infrastructure, LLC	Kore/Tule River Forest Biomass to Carbon Negative Biofuel	\$500,000
Biogas Energy Inc.	Cabin Creek Biomass Pyrolysis Facility	\$500,000
Redding Rancheria Economic Development Corporation	RREDCO Forest Biomass to Carbon-Negative Biofuels Pilot Program	\$500,000
Yosemite Clean Energy, LLC	Yosemite Clean Energy Paradise Biomass to Carbon Negative Fuels Plant	\$500,000
Sierra Institute for Community and Environment	Nor Cal Waste to Renewable Hydrogen	\$500,000
Mote, Inc.	Sacramento Carbon Negative Hydrogen Project 1	\$500,000



NEWS RELEASE



FOR IMMEDIATE RELEASE

Linde Enters Strategic Collaboration with Valley Link
Move Advances Authority's Vision to be Nation's First Passenger Rail System to Operate on Self-Produced Green Hydrogen Fuel

Tracy, CA

Blog |
Plug's California Green Hydrogen Plant Saves Water, Creates New Energy Source

Plug's California Green Hydrogen Plant Saves Water, Creates New Energy Source

December 6, 2022



Madera (Fresno County), CA

RAVEN

Raven SR,
Chevron and
Hyzon Motors
Collaborate to
Produce
Hydrogen from
Green Waste in
Northern
California

Richmond, CA

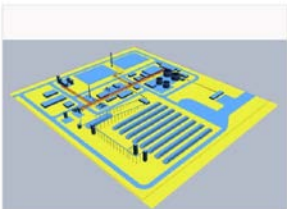
Bakersfield/Kern H2-related projects



Biomass plant near Bakersfield would bury or seal carbon in concrete

Mote Enters Advanced Stage of Engineering Design for Southern California Carbon-Negative Hydrogen Facility

- Company completes milestone preliminary design phase with engineering, procurement and construction (EPC) firm Fluor to validate technology in mission to convert wood waste to hydrogen
- Mote pushes closer to breaking ground on its first plant in Kern County, California
- Company also secures enough feedstock to supply the production of hydrogen at its first facility and accommodate future sites as part of its growth strategy



Fusion Fuel and Electus Energy Announce Exclusive Agreement to Develop a 75 MW Green Hydrogen Project in Bakersfield, California

Bakersfield would be Fusion Fuel's first project in United States, centerpiece of North American commercial strategy

Hydrogen energy may expand Kern's energy portfolio



Golden Empire Transit District (GET Bus)
@GET_Bus

This morning, GET officially unveiled our brand-new Hydrogen Fueling Station! 🚚☀️ This fueling station is the first in Kern County and was a huge and successful project.

3:40 PM · Nov 10, 2022 · Hootsuite Inc.



NREL
Transforming ENERGY

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» NREL, Kern Community College District Collaborate on Launch of First-of-Its-Kind California Renewable Energy Laboratory

NREL, Kern Community College District Collaborate on Launch of First-of-Its-Kind California Renewable Energy Laboratory

KCCD's new energy lab looks to support 'Carbon Valley'

BY JOHN COX jcox@bakersfield.com
Sep 11, 2022

1 of 2

6

Kore Infrastructure, LLC

Kore/Tule River Forest Biomass to Carbon Negative Biofuel

\$500,000

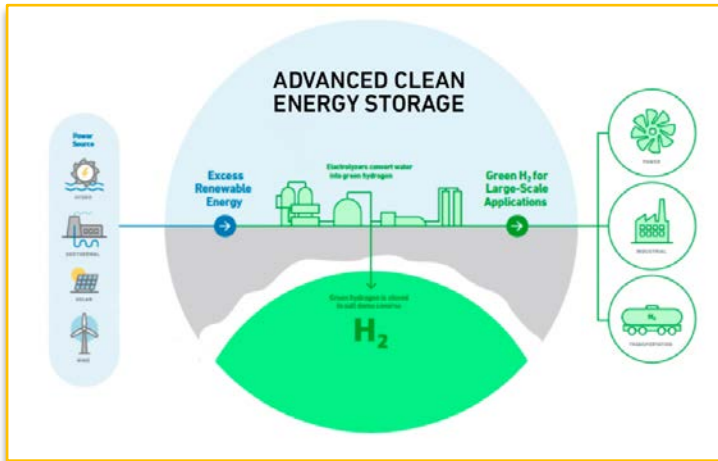


Other emerging mini-hubs

- Shasta region
 - Redding – entry point to Pacific Northwest
- Redwood Coast
 - Isolated communities
 - Humboldt – offshore wind
- San Joaquin Valley
 - Bakersfield/Kern
 - Fresno
- Central Coast
 - San Luis Obispo – offshore wind
- High deserts above Southern California
 - Antelope Valley
 - Victor Valley
 - Mojave Desert

Hydrogen as energy storage, etc .

ACES in Utah



Just one of the salt caverns at the Advanced Clean Energy Storage site has the capacity to store the entire state of California's monthly curtailed energy.

USA: Air Liquide operates the world's largest hydrogen storage facility

Air Liquide has recently commissioned the largest hydrogen storage facility in the world, an underground cavern in Beaumont, Texas, in the Gulf Coast region of the U.S.

Hydrogen microgrid project operational utilizing GKN Hydrogen's metal hydride hydrogen storage



GKN Hydrogen's HY2Medi now operational at renewable microgrid

Honda's Zero Emission Stationary Fuel Cell Provides Back Up Power to a Data Center

March 6, 2023

Corporate

- Stationary fuel cell (FC) on American Honda campus in Torrance, Calif. is a first step toward future commercialization of zero-emission backup power generation
- In the coming years, Honda will begin applying stationary FC power station technologies to Honda manufacturing facilities and data centers around the world
- Honda is advancing hydrogen fuel cells to provide clean, safe and secure energy toward its global goal of carbon neutrality for all products and corporate activities by 2050



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Journalism for the
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03 May 2019, 13:20 Sören Amelang

German research initiative plans world's first green hydrogen cavern storage

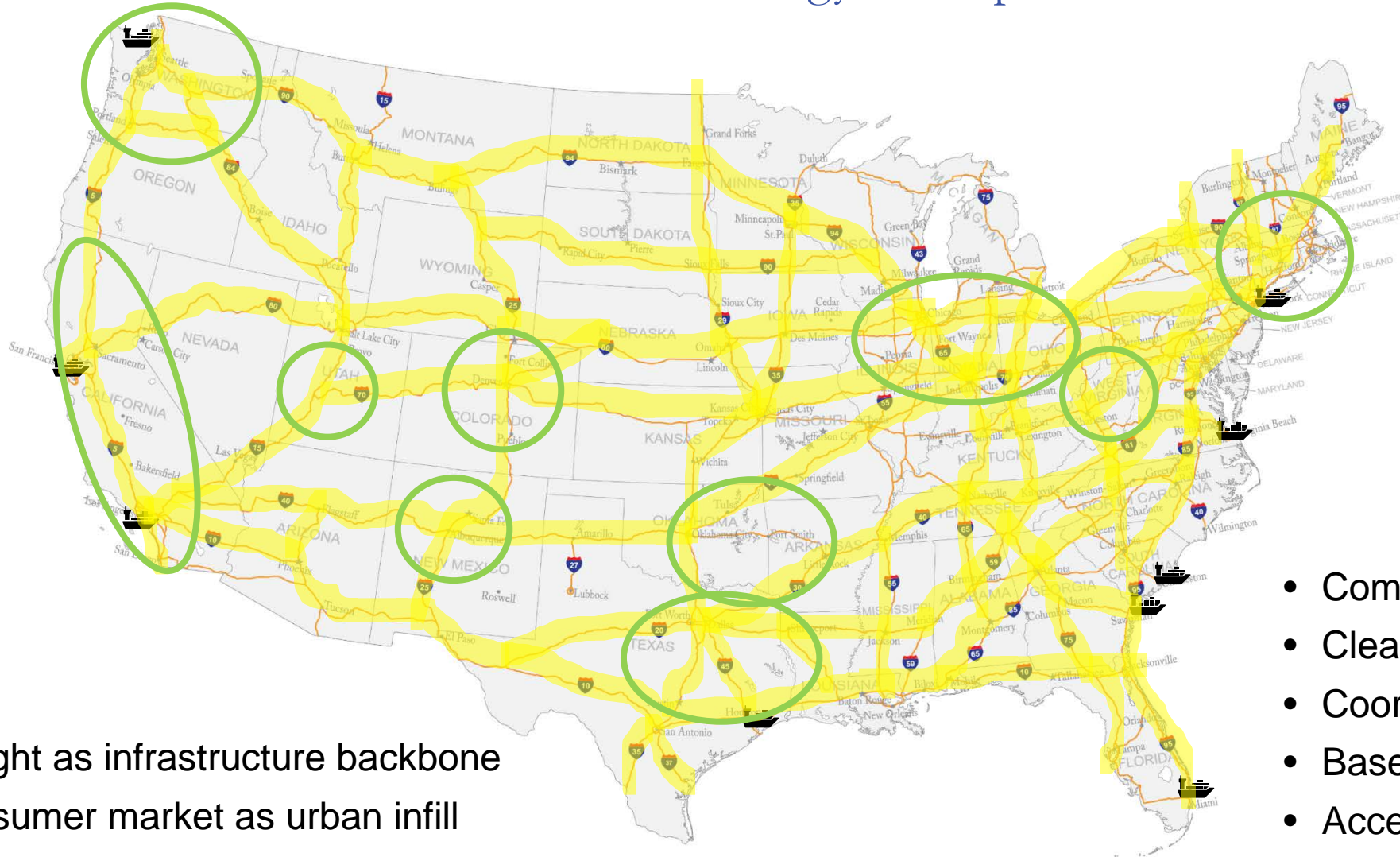
Hydrogen mobility





North American Hydrogen Mobility Strategy

Initial Strategy Concepts



- HD freight as infrastructure backbone
- LD consumer market as urban infill
- H2 production and demand coordination

- Common Vision
- Clear Targets
- Coordinate Investments
- Based on Experience
- Accelerate Decarbonization

H2FCP Resources

Key Documents

- **Truck Vision** – <https://h2fcp.org/truckvision>
- **2020 Mobile Source Strategy** - <https://ww2.arb.ca.gov/resources/documents/2020-mobile-source-strategy>
- **Self-Sufficiency Study** - <https://ww2.arb.ca.gov/resources/documents/hydrogen-station-self-sufficiency-report>

H2FCP Pages

- Station Map – www.h2fcp.org/stationmap
- SOSS – <https://m.h2fcp.org>
- By the Numbers – www.h2fcp.org/by_the_numbers
- Resources – www.h2fcp.org/resources
- News clips – www.h2fcp.org/news
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