Retail Hydrogen Fueling Station Network Update

Ben Xiong, Keith Malone, Dave Park

4/15/2021
CaFCP Members

— 20+ years of collaboration —
New members

DAIMLER

Daimler Trucks
North America

Ford

lancaster + ca
it's positively clear
CaFCP Station Map & SOSS

http://cafcp.org/stationmap  |  http://m.cafcp.org
An Expanding Hydrogen Station Network

- California Energy Commission hydrogen station funding (GFO 19-602)
  - 114 stations funded over several years
    - 30 stations funded in first batch
- Breakdown of all stations funded
  - Shell - 51
  - First Element - 49
  - Iwatani - 14
- Iwatani will also build six additional stations not funded by this GFO.

*Includes 15 stations in development that are 100% privately funded

Source: Governor’s Office of Business and Economic Development
Retail Hydrogen Stations & Network Health

New Stations Opened
• Mission Hills
• Sunnyvale

Commissioning Schedule
• Campbell
• Studio City
• Sherman Oaks
• Placentia
• Concord
• Aliso Viejo

Stations currently unavailable
• Ontario
• Riverside
• Newport Beach
• Berkeley
• SF Harrison St

Iwatani station announcement
• Seven stations being built with private funds
• Six that were originally listed in GFO 19-602
• Plus one more

H2 stations list - https://cafcp.org/sites/default/files/h2_station_list.pdf
## By the Numbers

<table>
<thead>
<tr>
<th>Numbers as of August 1, 2020</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>FCEVs—Fuel cell cars sold and leased in US</em></td>
<td>8,475</td>
</tr>
<tr>
<td>FCEBs—Fuel cell buses in operation in California</td>
<td>48</td>
</tr>
<tr>
<td><em><strong>Hydrogen stations available in California</strong></em></td>
<td>42</td>
</tr>
<tr>
<td>Fuel cell buses in development in California</td>
<td>7</td>
</tr>
<tr>
<td>Fuel cell shuttles in development in California</td>
<td>4</td>
</tr>
<tr>
<td><strong>Retail hydrogen stations in development in California</strong></td>
<td>15</td>
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</tbody>
</table>

<table>
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<th>Numbers as of April 1, 2021</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>FCEVs—Fuel cell cars sold and leased in US</em></td>
<td>9,961</td>
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<tr>
<td>FCEBs—Fuel cell buses in operation in California</td>
<td>48</td>
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<tr>
<td>Fuel cell buses in development in California</td>
<td>7</td>
</tr>
<tr>
<td><strong>Hydrogen stations available in California</strong></td>
<td>45</td>
</tr>
<tr>
<td>Retail hydrogen stations in construction in California***</td>
<td>9</td>
</tr>
<tr>
<td>Retail hydrogen stations in permitting in California***</td>
<td>38</td>
</tr>
<tr>
<td>Retail hydrogen stations in proposed in California***</td>
<td>16</td>
</tr>
<tr>
<td>Retail hydrogen stations in funded, but not in development in California***</td>
<td>72</td>
</tr>
<tr>
<td><strong>Total retail hydrogen stations in development in California</strong>*</td>
<td>135</td>
</tr>
<tr>
<td>Retail truck hydrogen stations in construction in California</td>
<td>3</td>
</tr>
<tr>
<td>Retail truck hydrogen stations in funded, but not in development in California***</td>
<td>5</td>
</tr>
</tbody>
</table>

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*Vehicle sales data from Baum and Associates. Sales data is based on car sales sold by a dealer to a retail or fleet customer. [FCEV Sales Data sheet](https://cafcp.org/by_the_numbers)*

FCEB Source: AQ Transit, Orange County Transportation Authority (OCTA), SunLine Transit, UC Irvine

Hydrogen station source: Air Liquide, Air Products, GO-Biz, ITM Power, Iwatani, Shell, True Zero

**Stations in development is based on stations planned for light-duty hydrogen fuel cell vehicles following applicable standards. See below for a listing of California funded stations.**

***Open for retail and available to light-duty hydrogen fuel cell vehicles following applicable standards. A listing of California funded stations can be found [here](https://cafcp.org/by_the_numbers).**
H2 Supply and Distribution

- [https://m.cafcp.org/](https://m.cafcp.org/) (SOSS) is your friend
- Hydrogen supply is and has been challenging
  - Wholesale hydrogen supply constraints
  - Capital equipment technical challenges (compressors, POS, distribution trailers)
  - High demand for licensed carriers
- Wholesale Activity
  - New hydrogen liquifier plants coming online as early as this summer
  - New hydrogen production plants coming online in early 2022
  - Industrial gas companies are exploring more long-term production capacity
- Retail Activity
  - More stations- both publicly and privately funded
  - Higher capacity, multiple fueling position stations
  - Faster station development time, ala GoBiz Hydrogen Station Permitting Guidebook

https://www.reddit.com/user/toyotausa/comments/mnnglh/were_jackie_saeed_and_daniel_from_the_toyota/
California H2 stations in 2020, 2025 and 2030

**BY 2020**
- **100** hydrogen stations by 2020.
  - Funded by Assembly Bill 8 (2013).

**BY 2025**
- **200** hydrogen stations by 2025, pursuant to the Governor’s 2018 ZEV infrastructure Proposal.

**BY 2030**
- **1000** hydrogen stations by 2030 with favorable market conditions and state policies pursuant to the CAFCP 2030 vision. Will support 1,000,000 fuel cell electric vehicles.

**Governor’s goal of 5,000,000 zero-emission vehicles by 2030.**
Cars! (and vans!)

Stellantis says hydrogen fuel cell vans to hit Europe by end of 2021

PARIS (Reuters) - Carmaker Stellantis said on Wednesday it will begin deliveries in Europe of its first medium-sized vans powered by hydrogen fuel cells by the end of 2021.

Riversimple

2021 Renault Master ZE Hydrogen

Segway
Hydrogen & Fuel Cell Activity – U.S.

Michael Andretti on going green with hydrogen fuel

Team owner, racecar driver, and entrepreneur Michael Andretti on the Andretti’s Group’s recent foray into hydrogen fueling.

California And Texas Vie To Be America’s Hydrogen Capital

Jim Magill Contributor © Sustainability
I write about energy and emerging technologies in the energy sector.

Plug Power Plans North America’s Largest Green Hydrogen Plant

David R. Baker 2/25/2021

(Bloomberg) -- Plug Power Inc. will build the continent’s biggest green hydrogen plant in New York state, as the company once known for selling forklifts aggressively moves into producing the clean-energy fuel.

Red Bull and ORECA to build Le Mans hydrogen car for 2024

Red Bull Advanced Technologies will partner with French constructor ORECA to produce the chassis for the new hydrogen class set for introduction at the Le Mans 24 Hours in 2024.

It was an old apple orchard. Now it could be the future of clean hydrogen energy in Washington state

April 15, 2021 at 6:00 am | Updated April 16, 2021 at 9:28 am
Hydrogen & Fuel Cell Activity – U.S.

New Energy and Industrial Technology Development Organization (NEDO)

Los Angeles Times ad by NEDO
Hydrogen & Fuel Cell Activity - Global

Europe

- 30 countries with hydrogen roadmaps
- 228 large-scale hydrogen projects
- 85% located in Europe, Asia, and Australia.

China

- China's capital envisages 10,000 fuel cell vehicles by 2025

Hydrogen Council

- 109+ members

- 30 countries with hydrogen roadmaps
- 228 large-scale hydrogen projects
- 85% located in Europe, Asia, and Australia.
Heavy Duty: Bus & Truck

Light duty needs heavy duty; heavy duty needs light duty

Fuel Cell Electric Trucks

• Advanced Clean Fleet rule

• Fueling infrastructure projects
  • 4 Heavy-duty H2 stations
    • Long Beach, Ontario, Wilmington and West Sacramento (see map)

• CARB & CEC HD ZEV funds
  • Drayage GFO NOPA
  • Retail H2 stations NOPA
    • Some offer HD FCET fueling
The Other Electric Bus

Innovative Clean Transit rule

- California transit on zero-emission pathway
- Zero Emission Rollout Plans submissions continue
- Hydrogen fueling RFPs
  - Golden Empire (Bakersfield)
  - North County (San Diego)
Energy Observer

CaFCP online briefing on
Energy Observer
May 5, 2pm (Pacific)
Register at www.cafcp.org/events

- Long Beach: April 23 to 27
- San Francisco: May 1 to 5
- Hawaii: May 23 to 31
- Tokyo: July 21 to August 15
**NOTICE:** During periods of high humidity or increased use, the nozzle may become frozen and difficult to disconnect from the vehicle. If this occurs, **DO NOT POUR WATER OR SPRAY ANY CHEMICALS ON THE NOZZLE** as this may damage it.

Prior to fueling, wipe down the nozzle with a lint-free cloth.

If the nozzle becomes frozen, pull the collar back with one hand while pushing forward on the handle. This may help release the nozzle locking mechanism and aid removal.

Placing the nozzle back in the dispenser holster will start an air dryer mechanism, which assists in drying the nozzle. The sound of the air dryer is normal.
References

- **KEY DOCUMENTS**
  - California Fuel Cell Revolution - [https://cafcp.org/sites/default/files/CAFCR.pdf](https://cafcp.org/sites/default/files/CAFCR.pdf)
  - U.S. Hydrogen Road Map (full report) - [https://cafcp.org/sites/default/files/Road%2BMap%2Bto%2BU%2BEconomy%2BFund%2BReport.pdf](https://cafcp.org/sites/default/files/Road%2BMap%2Bto%2BU%2BEconomy%2BFund%2BReport.pdf)
  - Hydrogen Council-Path to hydrogen competitiveness A cost perspective (full study) - [https://cafcp.org/sites/default/files/Path-to-Hydrogen-Competitiveness_Full-Study-1.pdf](https://cafcp.org/sites/default/files/Path-to-Hydrogen-Competitiveness_Full-Study-1.pdf)
  - CTE Guide for Deploying Zero-Emission Buses
  - Zero Emission Bus Rollout Plans in California – [www.cafcp.org/resources](http://www.cafcp.org/resources); key word is rollout
  - Hydrogen Station Permitting Guidebook - [https://www.businessportal.ca.gov/zero-emission-vehicle-program/zev-resources/](https://www.businessportal.ca.gov/zero-emission-vehicle-program/zev-resources/)

- **CAFCP PAGES**
  - Station Map – [www.cafcp.org/stationmap](http://www.cafcp.org/stationmap)
  - SOSS – [http://m.cafcp.org](http://m.cafcp.org)
  - Resources – [www.cafcp.org/resources](http://www.cafcp.org/resources)
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