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A Look At Hydrogen Fueling Infrastructure In 2018

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9-11 minutes



September 14th, 2018 by

Filling up a hydrogen fuel cell electric vehicle (FCEV) is one of those unknowns that many buyers might not consider until it's time to actually head to a station and fill up for the first time. We are in the unique position to try out many of the latest and greatest vehicles, including a handful of FCEVs.

A key part of the ownership experience is the fueling experience, including finding stations and the physical process of fueling up the vehicle. Thankfully, filling up is a fairly painless experience, but it is different enough to warrant a quick introduction.

After a few days of driving the Honda Clarity Fuel Cell loaner around town, it was getting low on hydrogen, but with right around 120 miles of range left and only 30 miles to the first station on our

route, we weren't concerned and headed out on an adventure.

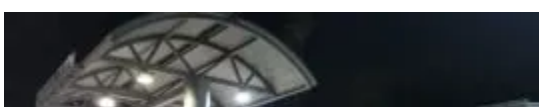
Finding a hydrogen fueling station

With 21 hydrogen fueling stations, the greater Los Angeles area has more hydrogen fueling stations than any other metropolitan area in the world today. To find the nearest station, we started out using the in-car navigation that conveniently allowed us to select the station as a point of interest and had us on our way in no time.



Upon arriving at the nearest fueling station, we spent a few frustrating minutes trying to pay for hydrogen and went to talk to someone at the station for help. We quickly learned that the single hydrogen station is not operated or supported by the station personnel, nor were they interested in helping. A few minutes later and we were on the phone with the station operator, True Zero, only to find out that the payment error messages we received were some sort of cryptic way of telling us that the station was out of hydrogen. None. Empty.

The True Zero customer service representative on the phone tried to route us to the nearest True Zero station that had hydrogen but it was a 100 mile round trip out of our way, so we opted not to go that route and instead went back to our trusty in-car navigation to get on the way to the next station along our route.





Upon arriving at the second station, it was closed (only open 7am -7pm), so we went on to the next station. Back to the in-car navigation, we moved along to the third station along our route, which turned out to be on the California State University, Los Angeles campus, which actually makes hydrogen on-site. They had to have fuel, right? Nope.

We arrived to find the station itself locked up with a red tag that indicated that the station was offline. After some frustrated walking around, we thankfully happened upon one of the technicians who worked in the actual hydrogen production part of the station who shared that they had been asked by Toyota to not sell any more fuel and to save what they had for a large shipment in the morning.



Some research turned up the Hydrogen Station Finder App by Air Liquide. It is a great app as it not only shows the *number* of stations on the map, it also displays the status of each station in red and green. I realized that my route was doomed from the start and that most of the stations in the LA area were, in fact down, for one reason or another.

Apps and connected solutions that can tell not only where stations

are, but if they are online or offline, are clutch in the wild west that is hydrogen fueling today. Even then, it's clear that the system is still very much in active development as station managers, automotive players and academia work together to keep the overall fueling system online as much as possible.

Hydrogen fueling station availability

We stopped at all 4 stations along our planned route and found that some were out of hydrogen (2), closed (1) or taken offline due to a large delivery from the station the next morning (1), which is apparently a thing. The fueling experience left a lot to be desired and opened my eyes to some of the growing pains of the hydrogen fueling network that are nearly impossible to see without just going out and experiencing it.

Checking the aforementioned app in the subsequent days revealed that many of the stations frequently oscillate from green, indicating their ability to provide hydrogen, to red, indicating that they were not able to supply hydrogen for one reason or another. Gas stations are so ubiquitous that we simply don't think about whether or not they have gas. Even if one is out of fuel for one reason or another, there's likely to be another station within a few blocks or miles along most routes.

Hydrogen is such a young technology that we are still counting the number of stations as they are added, one at a time. California is currently home to all 36 of the hydrogen fueling stations in the entire US and Canada. 21 of those stations are located in the greater Los Angeles area and of those stations, 14 were offline for one reason or another when we made our trip. That wasn't the plan or something we even knew to check for at the time.

It doesn't appear to be a fluke but it does represent one of the big challenges for early adopters of hydrogen fuel cell vehicles. People are just used to stations being open for business and hydrogen stations are not yet operating at the same levels of reliability we've grown accustomed to.

Hydrogen pricing

Fuel pricing is also a new world with hydrogen, as consumers are suddenly faced with fuel being served up on a per kilogram basis. Much like we have done with electric cars, translating vehicle efficiency from miles per gallon to miles per kilowatt-hour, buyers will have to translate their thoughts and habits into miles per kilogram.

With the low volumes they're currently operating at, the price per kilogram is still rather expensive at \$15.99 – \$16.36 for the stations we visited around the greater Los Angeles area. To offset the high early adopter pricing on hydrogen, both [Toyota](#) and Honda provide a fuel card loaded up with \$15,000 that is valid for the duration of the three year vehicle lease.

More work is needed to build a bridge to both affordable, centralized generation + transportation solutions as well as more compact, affordable on-site hydrogen generators and compressors. The hydrogen supply chain is very much in development and is experiencing the growing pains of scaling up, but it is one that has potential looking forward if it can overcome some of the massive hurdles it faces with well to wheel efficiency, fuel pricing, production, well to wheel emissions, etc.

Fueling the car

To fuel up the car, the process is very similar to that of any other petrol car for the most part. Pull up at the station and simply follow the on-screen prompts to process payment, connect the nozzle and get going. Once the nozzle is attached, the filling commences and feels very normal. Unlike petrol stations, the hydrogen is fed into the vehicle in pulses, which the on-screen prompts indicate is normal.



As you can see in the video below, the nozzle and handle get very cold when pumping the compressed hydrogen, with much of the nozzle frosting over during the process. There is a fancy pairing system that the nozzle uses to talk with the car that makes use of some invisible LED lights that showed up on the video below, but could not be seen by the naked eye.

The whole process is over in a matter of minutes. That is actually the main selling point for FCEVs compared to battery electric vehicles, but it's clear that there are still some significant growing pains to be worked out before that dream is a reality. Spending several hours just trying to find a station very quickly offsets any savings in time, especially considering that most EV miles are recharged at night, with essentially no extra effort required.



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About the Author



[Kyle Field](#) I'm a tech geek passionately in search of actionable ways to reduce the negative impact my life has on the planet, save money and reduce stress. Live intentionally, make conscious decisions, love more, act responsibly, play. The more you know, the less you need. As an activist investor, Kyle owns long term holdings in BYD, SolarEdge, and Tesla.