

Clean & Prosperous Washington California Study Mission 2022

Michael Lord, Executive Engineer
Sustainability & Regulatory Affairs.
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Our Goal: Carbon Neutrality and Sustainability



TOYOTA



Toyota's Electrification Viewpoint

- BEV, PHEV and FCEVs all have a Role to Play
- BEV/PHEV where home charging is convenient
- PHEV for second car, or when public charging is not sufficient
- FCEV where home charging is not convenient and long distance fast refueling is key.

Current Product and Global Announcement

Current Product



Mirai Fuel Cell Electric Vehicle



Prius Prime Plug in Hybrid



RAV4 Prime Plug in Hybrid



BZR4 BEV



NX450 + Plug in Hybrid



RZ BEV

Dec 14 Global Announcement



Toyota plans to invest approximately \$70 billion globally in electrified vehicles including HEVs, PHEVs, FCEVs and BEVs. Of that amount, approximately \$35 billion will be invested in BEVs starting in 2022 through 2030.

Role of FC and H2

Fast, Central,
Universal
Fueling



Cold
Weather
Performance



Good for
Areas Without
Private Parking

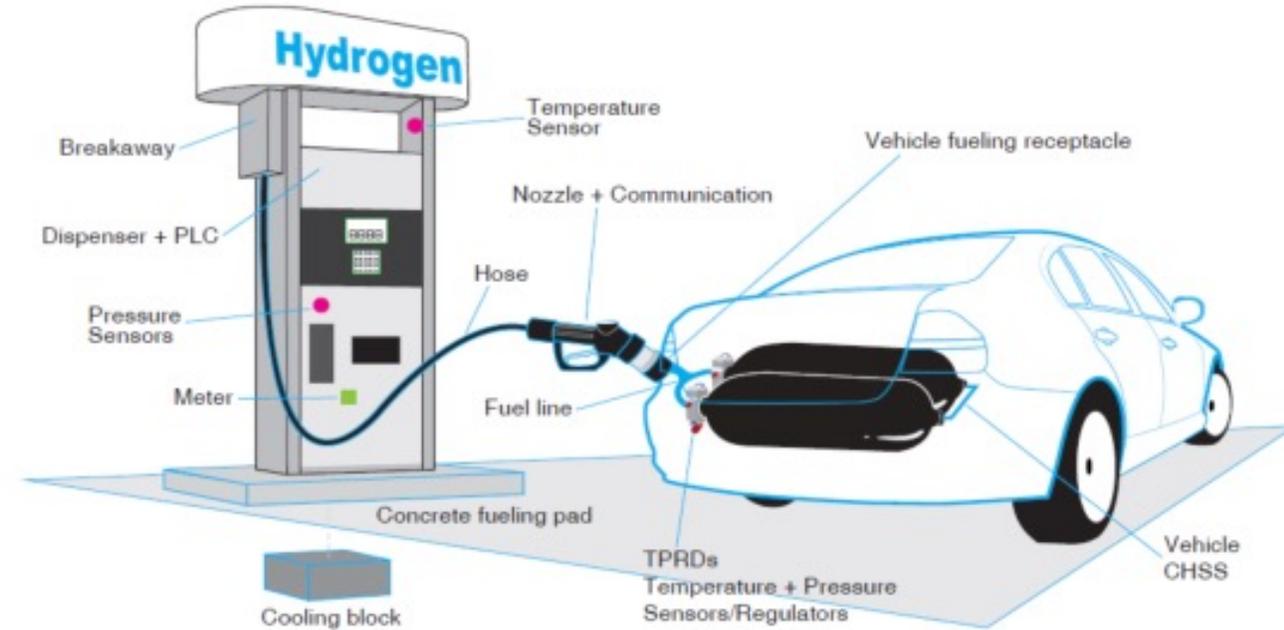


Good for
Long Distances,
Short Downtime



Fuel Cell Electric Vehicle Fueling

- Fast
 - 3-5 minutes for 400+ mile range
 - Energy transfer rate: 2,400 kW equivalent!
- Centralized
 - Same business model as gasoline station
- No membership
 - Pay with standard credit/debit card
- Same for all light duty vehicles
 - Single nozzle/inlet standard
 - Single refueling protocol = standard refueling speed
- H2 plays a unique role by redirecting, storing, and distributing grid energy as a transportation fuel.
 - 500+ vehicle/day station can transfer 16 megawatts equivalent of H2 for electric drive without grid impact



Hot & Cold Weather Performance

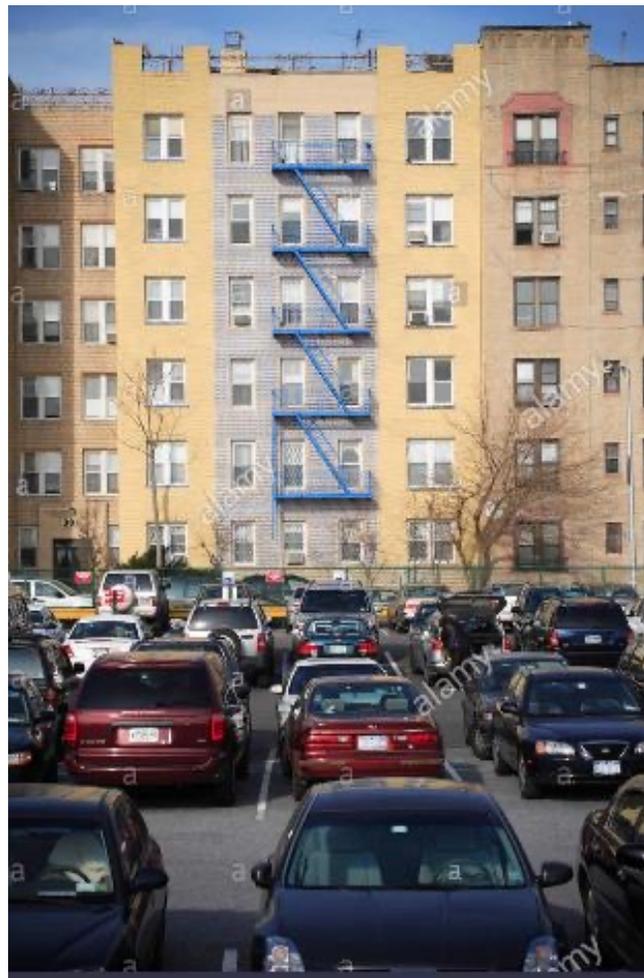
- At Hot and Cold weather have much less impact on range and performance than BEVs
 - Fuel cell warms up quickly to full performance



FCEVs: An Excellent ZEV Option Where Home Charging is Difficult...

For customers:

- Living in apartment buildings with common parking areas
- Parking on the street
- Renting where landlord is hesitant to invest in charging stations



An Excellent ZEV Option where Minimal Downtime is Key

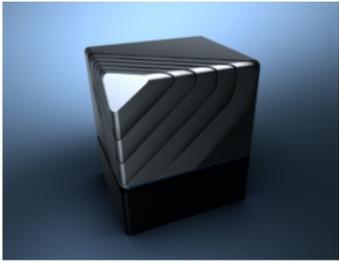
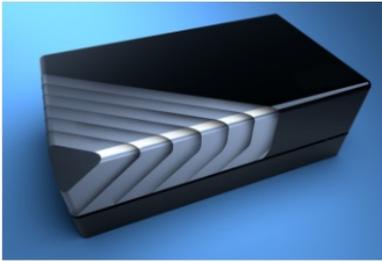
- Taxis
- Ride Share
- Car Share
- etc



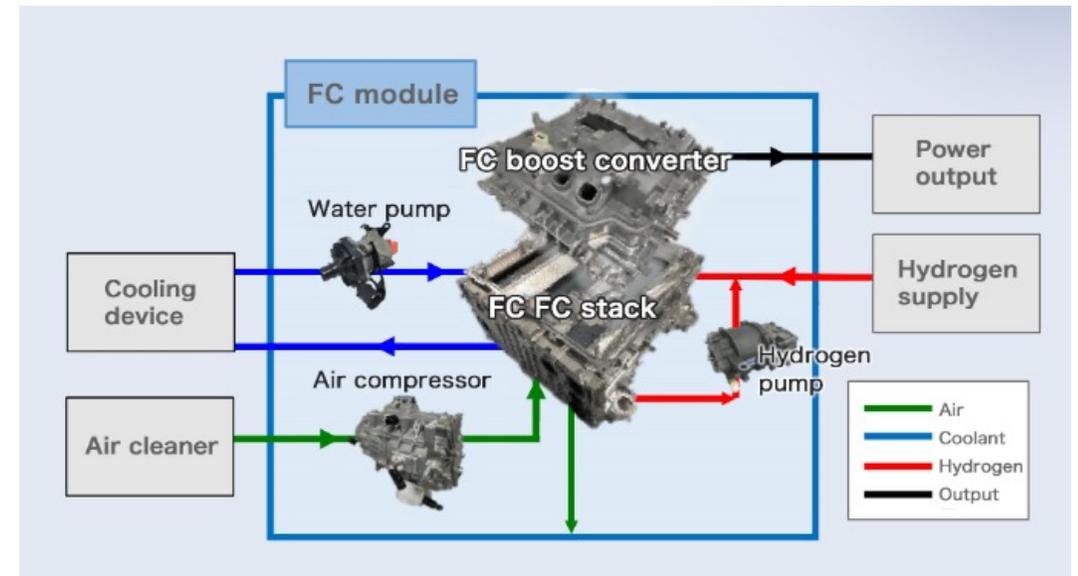
Beyond Light Duty



FC Module

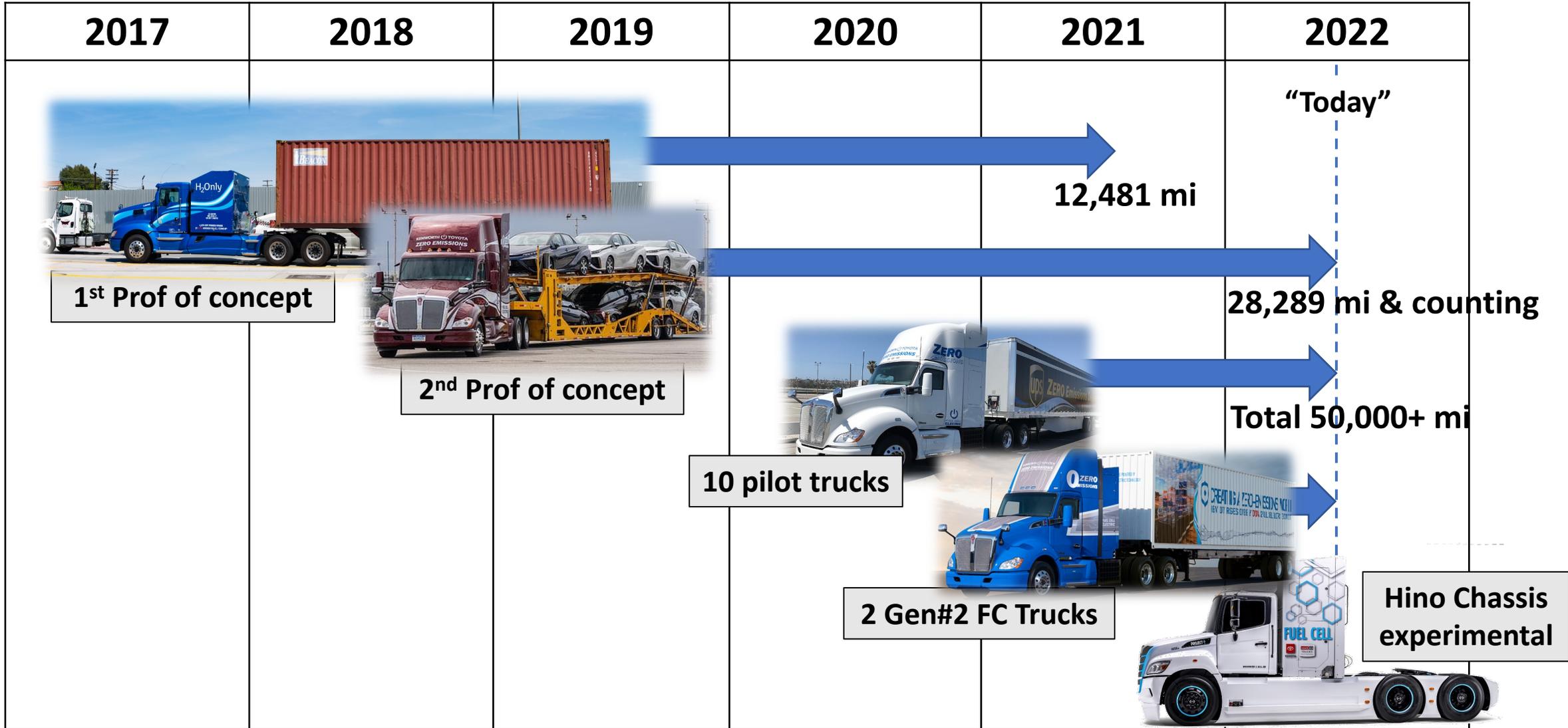
	Vertical (Type I)	Horizontal (Type II)
External appearance		
Size	L 890 / W 630 / H 690 mm	L 1270 / W 630 / H 410 mm
Mass	Approx. 250 kg	Approx. 240 kg
Rated output	60 kW and 80 kW variations	60 kW and 80 kW variations
Voltage	400 to 750 V	

*Includes development targets



<https://www.toyota.co.jp/fuelcells/en/technology.html>

Toyota Project Portal History

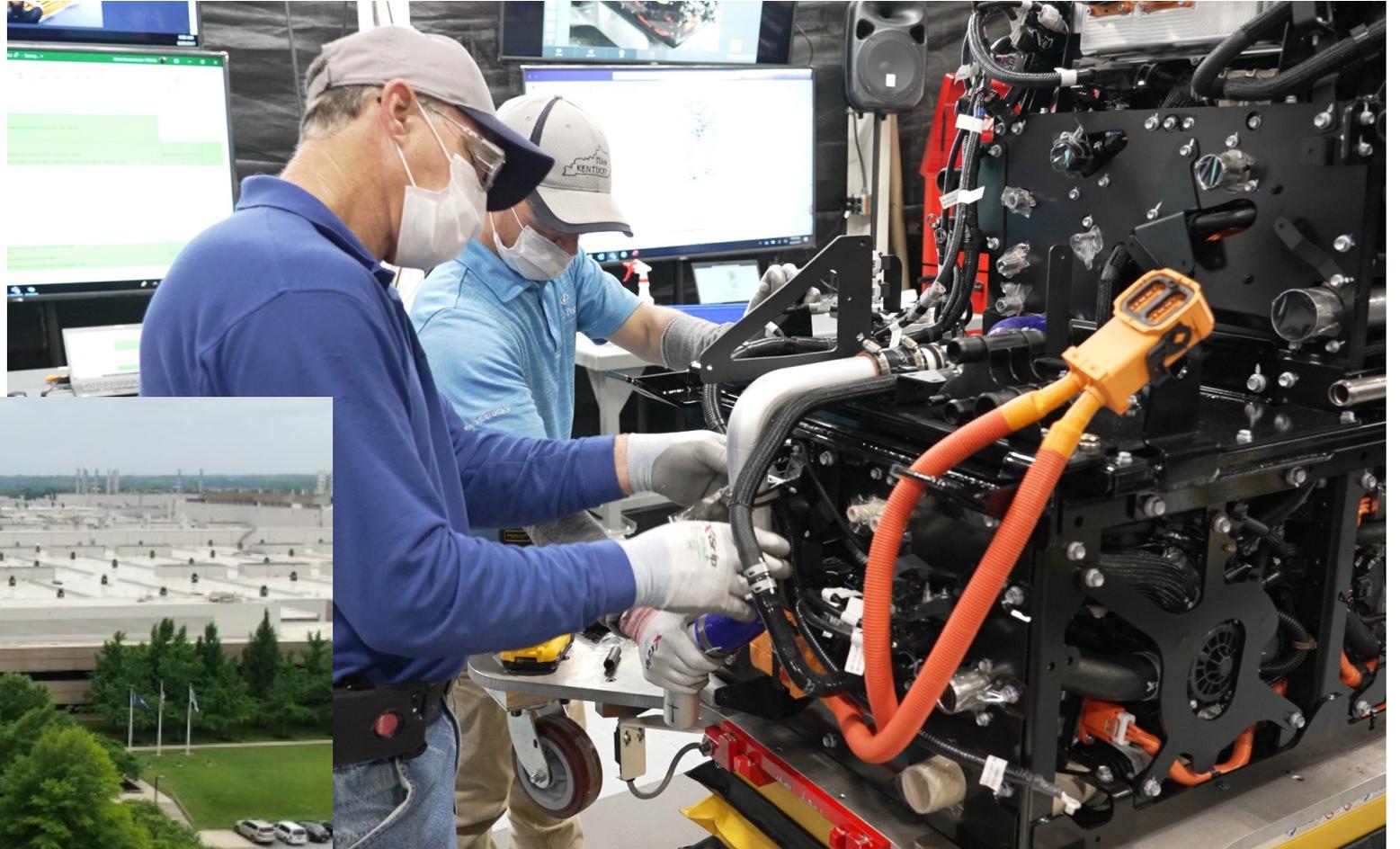


FC Kit for HDT

2023

FC KIT ASSEMBLY

Toyota Motor
Manufacturing
Kentucky



HD/LD Synergy - Vehicle



Light Duty provides the scale to reduce FC stack cost while Heavy Duty provides fuel demand to reduce H2 costs.

HD/LD Synergy - Stations

LD H2 Station Supports up to Class 6 Commercial Vehicles



HD H2 Station Supports LD for Connector stations on Freeways

