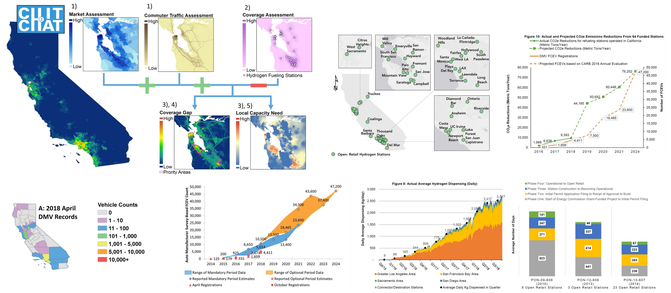
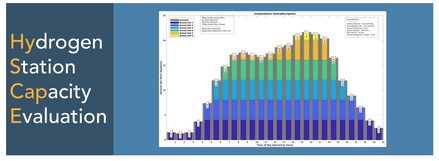
Light-Duty Hydrogen and FCEV Efforts in California

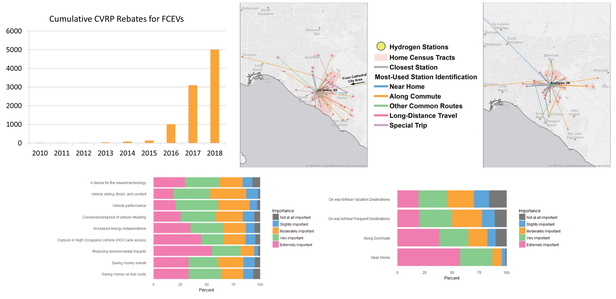
Station and Vehicle Deployment



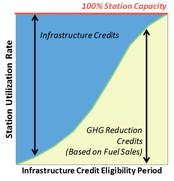
Station Testing and Evaluation



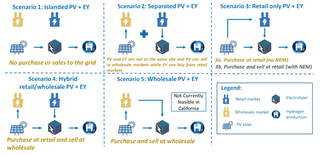
Vehicle Rebates

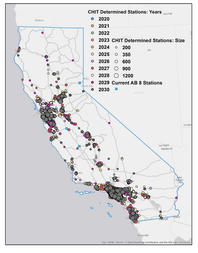


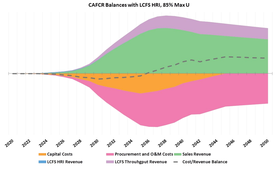
Fuel and Infrastructure Incentives

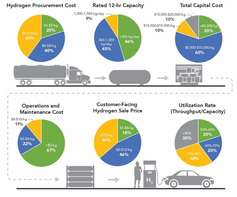


Future Opportunities









Resources

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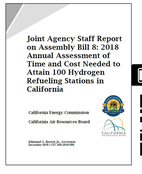

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STATE OF CALIFORNIA ENERGY COMMISSION

CALIFORNIA AIR RESOURCES BOARD

Heavy Duty and Off-Road Hydrogen and FCEV Projects

Pilot Commercial Deployment Projects

SunLine FCEBs & On-Site Hydrogen Generation

- Funding: $12.6M grant, $17.8M total
- Thousand Palms, Coachella Valley
- 5 NewFlyer Xcelsior® XHE40 Buses
  - 40' FCEBs, standard propulsion system
  - Ballard FCveloCity-HD 85kw modules
- Nel Hydrogen Production/Fueling Station
  - Modular PEM electrolyzer
  - 900 kg/day, 350 bar
  - Complete turnkey solution
- Buses delivered January 2019
- Station complete August 2019

Fuel Cell Electric Bus Commercialization Consortium

- Funding: $22.3M grant, $45.5M total
- 20 NewFlyer Xcelsior® XHE40 Buses

10 buses to Orange County (Southern CA)	10 buses to AC Transit (SF Bay Area)
Trillium/Air Products • Delivered LH2 • 1,750 kg/day - up to 50 buses • Service bay upgrade • Commissioning in May 2019	Messer, LLC – Station upgrade • Delivered LH2 • 1,050 kg/day – up to 30 buses • Commissioning in Dec. 2019
First 2 buses accepted, all buses to be deployed in June 2019	

Demonstration Projects

Zero-Emission Hydrogen Ferry

- Funding: $3M grant, $5.5M total
- Fuel cell ferry – 22 knots top speed and up to 84 passengers
  - BAE Systems – electric propulsion system
  - Hydrogenics – three 120kw fuel cells
  - On-board H2 storage for 2 days of operation
  - Air Liquide - 350 bar tube trailer at dock
- Ferry operational in September 2019
- Project complete in Spring 2020

Port of Los Angeles Shore-to-Store

- Funding: $41.1M grant, $82.5M total
- 10 hydrogen fuel cell Class 8 trucks
  - Kenworth truck w/ Toyota FC technology
  - 60 kg on-board storage
  - Developed in partnership with California Energy Commission and SCAQMD
- Two large-capacity H2 refueling stations
  - Wilmington and Ontario, California
  - Delivered gas, 1500 kg/day capacity, 700 bar
- First truck delivered summer 2019
- Stations complete spring 2020

Fast-Track Fuel Cell Truck

- Funding: $5.1M grant, $6.8M total
- 5 plug-in hybrid fuel cell electric Class 8 trucks
  - 3 trucks – update existing EV Navistar chassis, Hydrogenics fuel cells
  - 2 trucks – Peterbilt glider, Loop Energy fuel cells
- Drop-and-swap mobile tube trailers and chargers at Port of LA and Fontana
- Demonstration partners: TTSI and Daylight Transport
- Project complete: Spring 2020

Fuel Cell Hybrid Electric Top Loader

- Funding: $6.5M grant, $15.4M total
- Electric top loader demonstration
  - Hyster-Yale – build and integrate
  - Nuvera – two 45kw fuel cell engines
  - WAVE – two 250kw wireless charging systems
- Mobile refueler to provide hydrogen
- Fenix Marine Services will operate yard trucks in Port of LA
- Project complete: Spring 2020

Fuel Cell Hybrid Electric Delivery Van

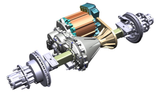
- Funding: $4.3M grant, $9.5M total
- UPS in Ontario and surrounding areas
- 15 FC hybrid delivery vans
  - Retrofitting existing UPS vans
  - Based on prototype built in partnership with DOE
  - Integration by Unique Electric Solutions
  - Hydrogenics 30kw fuel cell engines
- Goal: develop FC retrofit kit
- Complete: Spring 2021

Hybrid Fuel Cell Yard Truck

- Funding: $5.8M grant, $12.1M total
- 2 hybrid fuel cell 242,000 lb capacity yard trucks
  - BAE Systems powertrain-270hp, 3800 ft-lb torque
  - Ballard FCveloCity-HD 85kw fuel cell modules
  - 20 kg on-board H2 storage @ 350 bar
- HTEC stationary-placed mobile tube trailer
  - 400 kg storage at 450 bar
  - 2 kg/min dispensing
- TraPac will operate yard trucks in Port of LA
- Project complete: Spring 2021

Next Generation Fuel Cell Delivery Van

- Funding: $5.8M grant, $11.7M total
- UPS in Ontario and surrounding areas
- 4 FC hybrid electric delivery vans
  - Linamar - Gen 2.0 eAxle design integrated into new Ford F-59 chassis
  - Ballard - 30kw fuel cell engines
- Goal: develop FC retrofit kit
- Complete: Spring 2021



CALIFORNIA CLIMATE INVESTMENTS
Cap and Trade Dollars at Work

CALIFORNIA AIR RESOURCES BOARD