

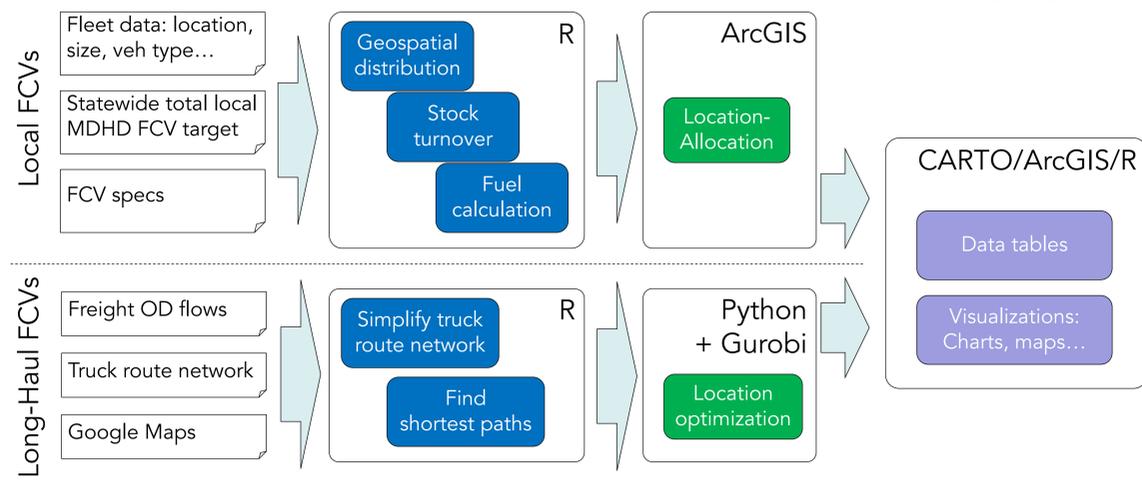
Research Questions

- In what applications are hydrogen medium- and heavy-duty fuel cell vehicles likely to be used?
- How much and where is hydrogen demanded?
- Where to layout hydrogen refueling infrastructure to meet such demand?

Methods and Data

Data Sources

- California Sustainable Freight Action Plan (2016)
- CaFCP Medium- and Heavy-Duty Fuel Cell Electric Truck Action Plan
- USDOT Freight Analysis Framework
- Caltrans GIS Library
- Web crawling (e.g. commercial fleet data)
- UCD researches on H2 trucks and infrastructure (Burke, Zhao, Miller, Yang, Ogden)



MD/HD FCVs: Local and Long-Haul

We split the MD/HD hydrogen FCV market into two segments: local and long-haul, and separately plan infrastructure for them.

Local

- Package delivery trucks
- Drayage trucks
- Transit buses



Long-haul

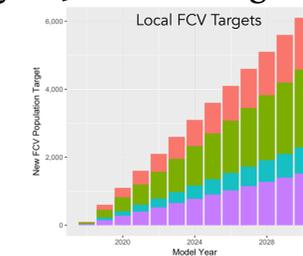
- Long-haul tractors



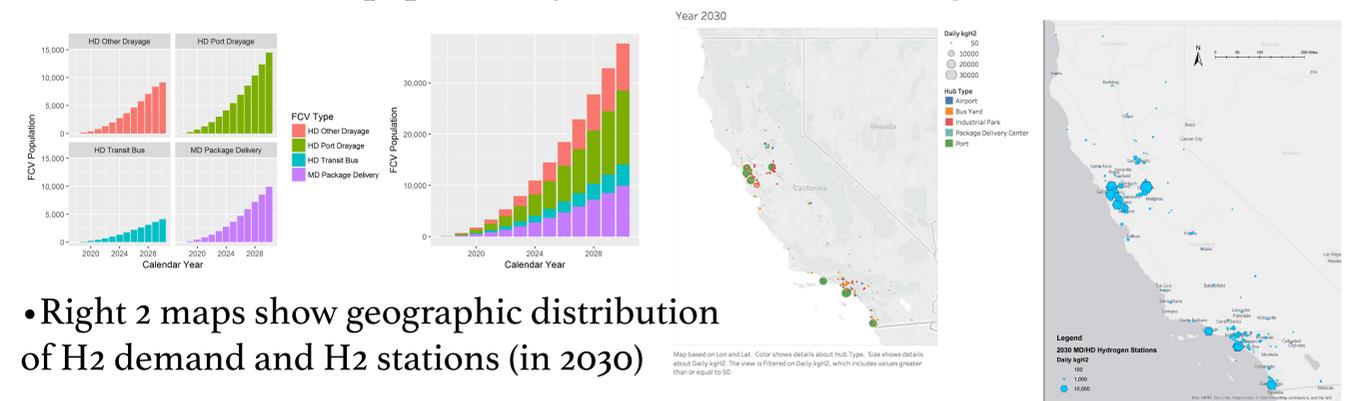
Results

For Local MD/HD FCVs

- We set a target of 40,000 FCVs by 2030, including...
 - 10K delivery trucks,
 - 5K are transit buses,
 - 15K are port drayage trucks,
 - 10K are other drayage trucks (same as port drayage trucks but not used at ports)



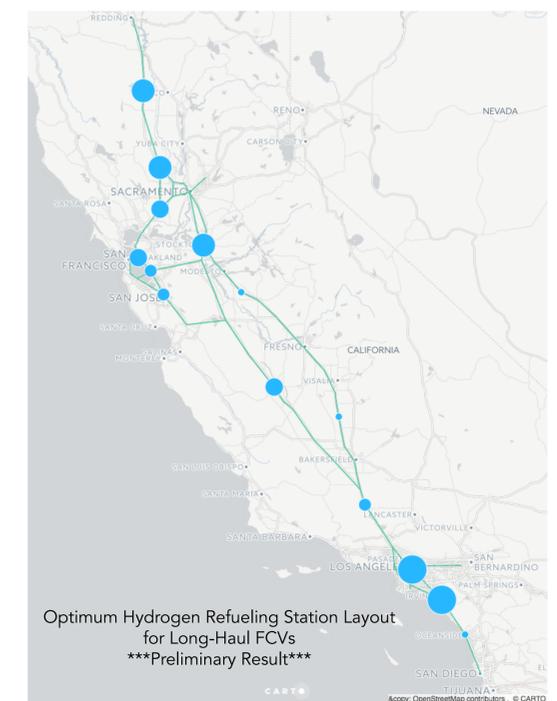
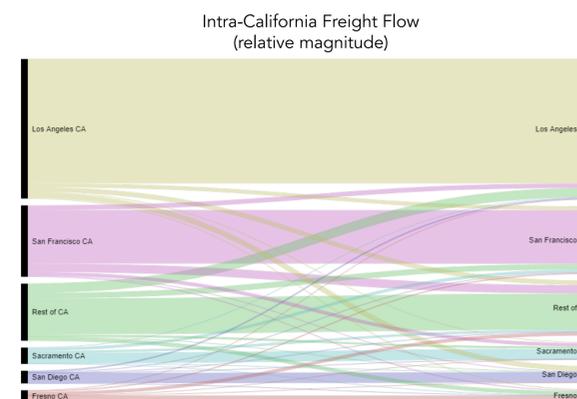
- They are assigned across 260+ fleet locations around the state
- Here's how the FCV population growth looks like (left 2 figures)



- Right 2 maps show geographic distribution of H2 demand and H2 stations (in 2030)

For Long-Haul MD/HD FCVs

- Distribute intra-state freight flow onto a simplified truck route network
- Choose optimal refueling locations to cover freight trips while minimizing number of stations



To Be Continued in 2018...

- Integrate local and long-haul H2 refueling networks
- Incorporate costs
- Study business cases for large scale H2 infrastructure