

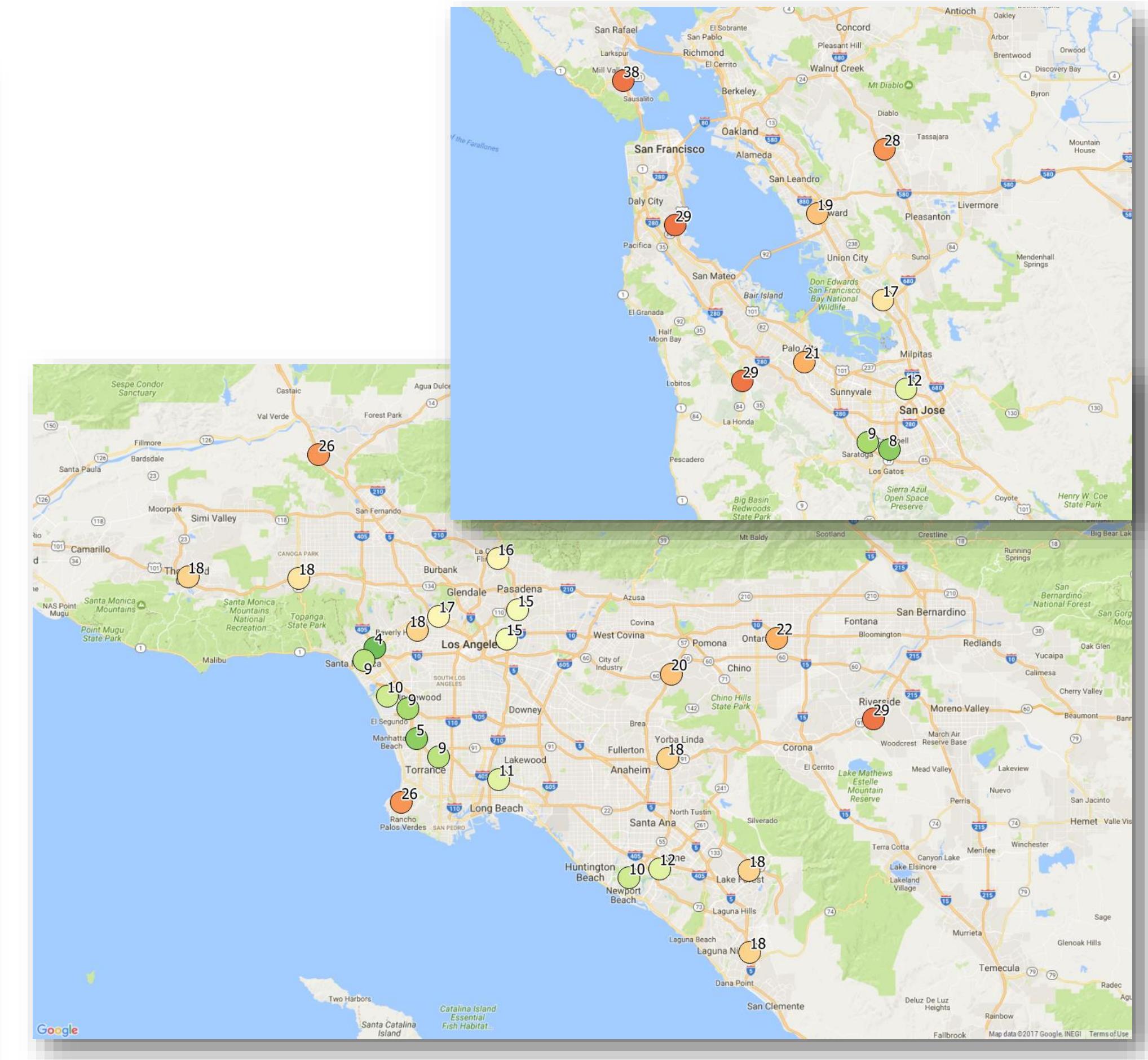
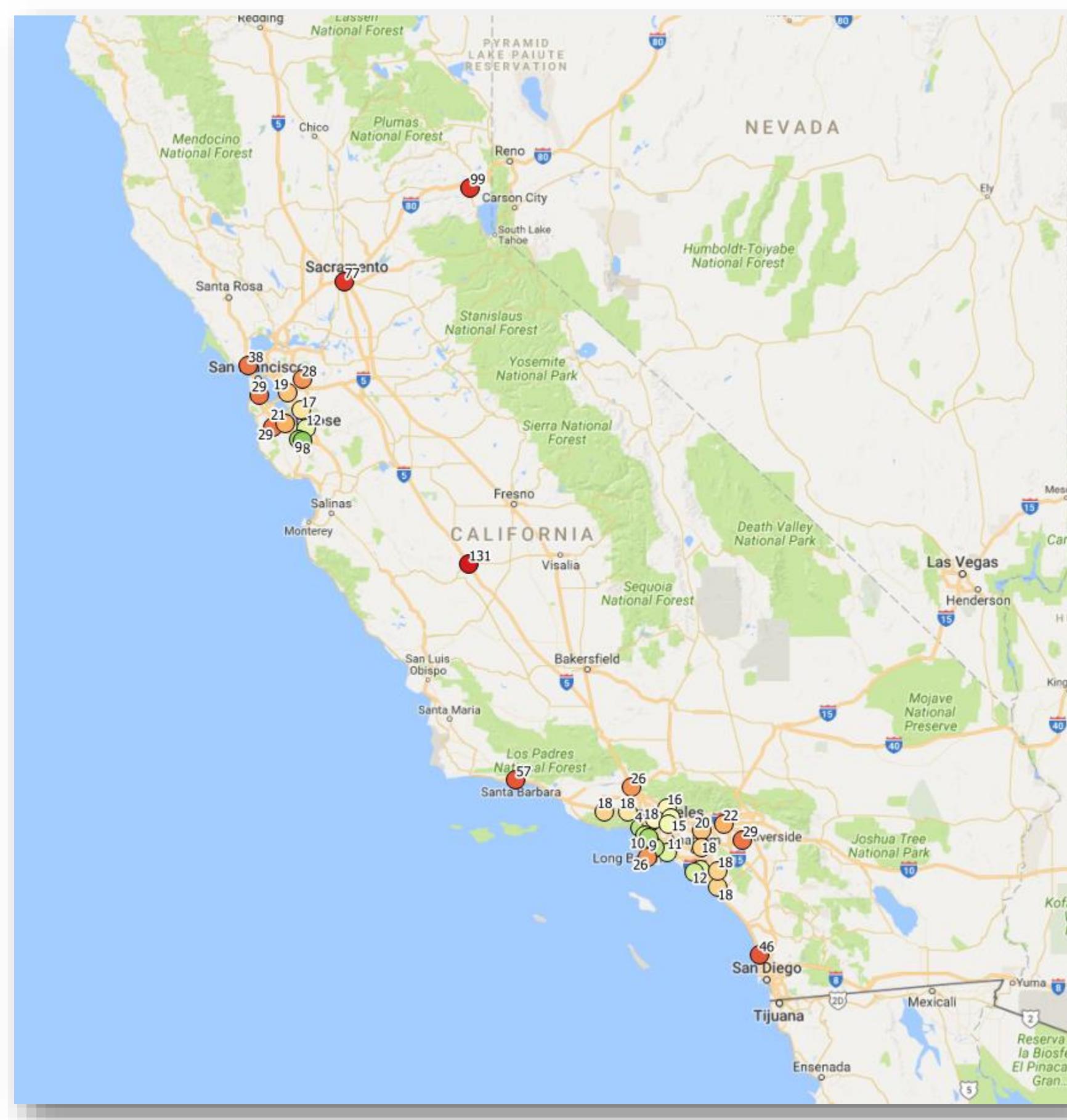


Research Question

- Hydrogen **infrastructure placement** models:
 - What models are being used to guide the placement of hydrogen stations in CA? What are the strengths and weaknesses?
 - Which models/modeling schemes are suitable for understanding the mid-term transition of hydrogen transportation?
- **Medium- and heavy-duty** hydrogen vehicles:
 - What kinds of MD/HD vehicles have the largest potential to adapt hydrogen?
 - How much hydrogen do the MD/HD vehicle market demand?
 - How are the hydrogen demands distributed geographically?
- **Transition scenarios:**
 - Business cases for H2 stations beyond the first 100?
 - Synergy & differences between LDV and MD/HDV sectors?
 - What are the timing, costs and benefits of introducing renewable hydrogen?

Results

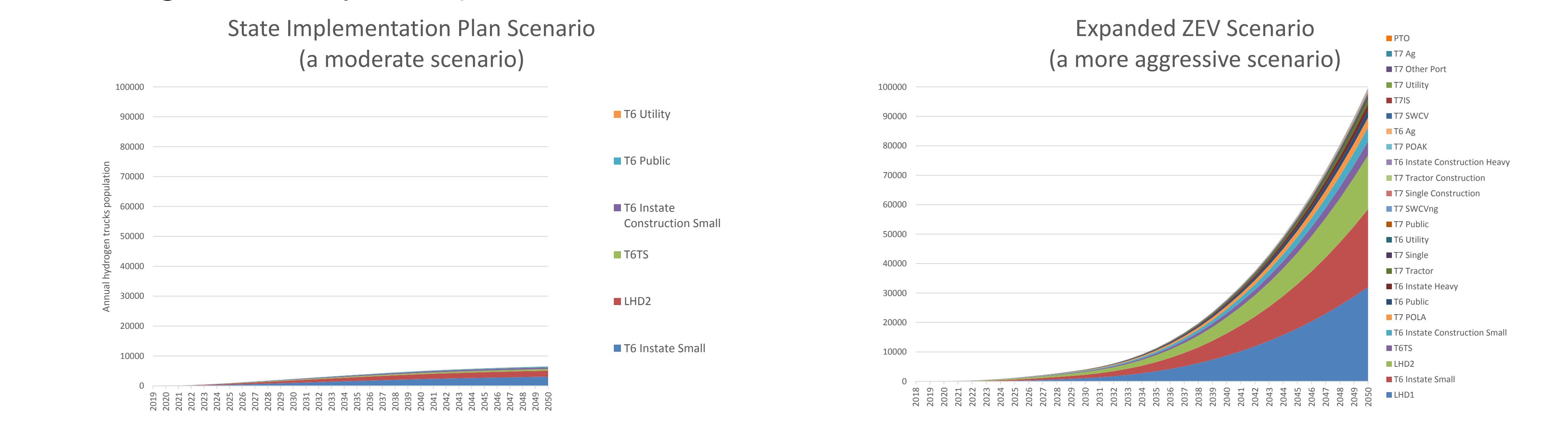
- We produced a map that analyzes the redundancy provided by the current H2 station network in California. The redundancy metric for each station is measured by the driving time (in minutes) to reach the nearest alternate station in case of station outage.



Methods and Data

- Literature reviews on:
 - Hydrogen refueling stations planning
 - Alternative fuel MD/HD vehicles
 - Hydrogen production & delivery systems
 - Renewable hydrogen production technologies
- Geospatial analysis:
 - Use geographic data to predict demand of hydrogen vehicles and hydrogen fuel
 - Assess the performance of existing, planned, or hypothetical H2 station networks
 - Produce maps reflecting geographic distribution of hydrogen demand & infrastructure in various scenarios
- Connecting with the industry
 - Collect latest knowledge of station operations
 - Understand costs of hydrogen infrastructure today & future
 - Learn about practical concerns in the infrastructure development

- Some H2 MD/HDV scenarios to be considered (obtained from California Vision Planning model by ARB):



About this study

- Next steps:
 - Further quantify MD/HD FCV scenarios,
 - Analyze H2 demands and geographic distribution
 - Add renewable hydrogen into consideration
- Need help with...
 - MD/HD fleets operation data (fleet sizes, trips, fuel consumption, etc.)
 - Hydrogen station capital & operating cost data