UC Davis Models

Geospatial Station Network Design Tool & Hydrogen Infrastructure Rollout Economic Analysis Model (University of California-Davis)

Objectives

Analyze regional strategies for early rollout of hydrogen infrastructure in support of fuel cell vehicle commercialization. Estimate how many hydrogen fueling stations would be needed and how much it will cost to develop cost competitive hydrogen supply. Compare the cost of hydrogen from different types and sizes of hydrogen stations under steady-state conditions, when stations are fully utilized.

Key Attributes & Strengths

The model presents robust data on costs and performance for early hydrogen fueling stations, as well as scenarios and strategies for deployment. Ability to conduct case studies for a projected hydrogen fuel cell vehicle rollout in California, utilizing GIS-based analysis for station siting and consumer convenience and economics from perspective of the network, individual station owners, and consumers.

Platform, Requirements & Availability

Microsoft Excel-based hydrogen infrastructure rollout spreadsheet model.

INPUTS

Current and future hydrogen station capital and O&M costs (based on input from industry, California Fuel Cell Partnership, California Energy Commission, and analysts at NREL, ORNL, ANL).



ASSUMPTIONS & DATA

- Consumer convenience measured in terms of "average travel time" (from home to station), and "diversion time" (average time to a station from any point in the region).
- Network design and economics of a "cluster strategy" (coordinated introduction of hydrogen vehicles and refueling infrastructure in a few focused geographic areas).
- Range of station sizes (100 kg H₂/d to 1,000 kg H₂/d), station types (compressed gas truck delivery, liquid hydrogen truck delivery, onsite reformer, onsite electrolyzer), and technical maturity (current, 2014-5, 2015+).

OUTPUTS

- Numbers, locations and types of hydrogen fueling stations built (in CA).
 - Capital and O&M costs.
- Hydrogen sales and cash flow over 10-15 year transition period.
- Estimate of break-even year (the year when the station produces hydrogen competitively with gasoline on a cents per mile basis) and subsidies required for various stakeholders.