

# H<sub>2</sub> Readiness

Best practices for hydrogen stations  
in early adopter communities



Presented at  
ACT Expo

# Fuel cell vehicles



# 2 audiences; 4 sections

- Community leaders
  - Hydrogen stations
  - Community engagement
- Planners and Permitters
  - Zoning, Codes & standards
  - Templates and guides

# SECTION 1: HYDROGEN STATIONS

## Benefits of hydrogen and FCEVs

Local, renewable fuel.

2-3 times more efficient.

200-400 miles on a tank.

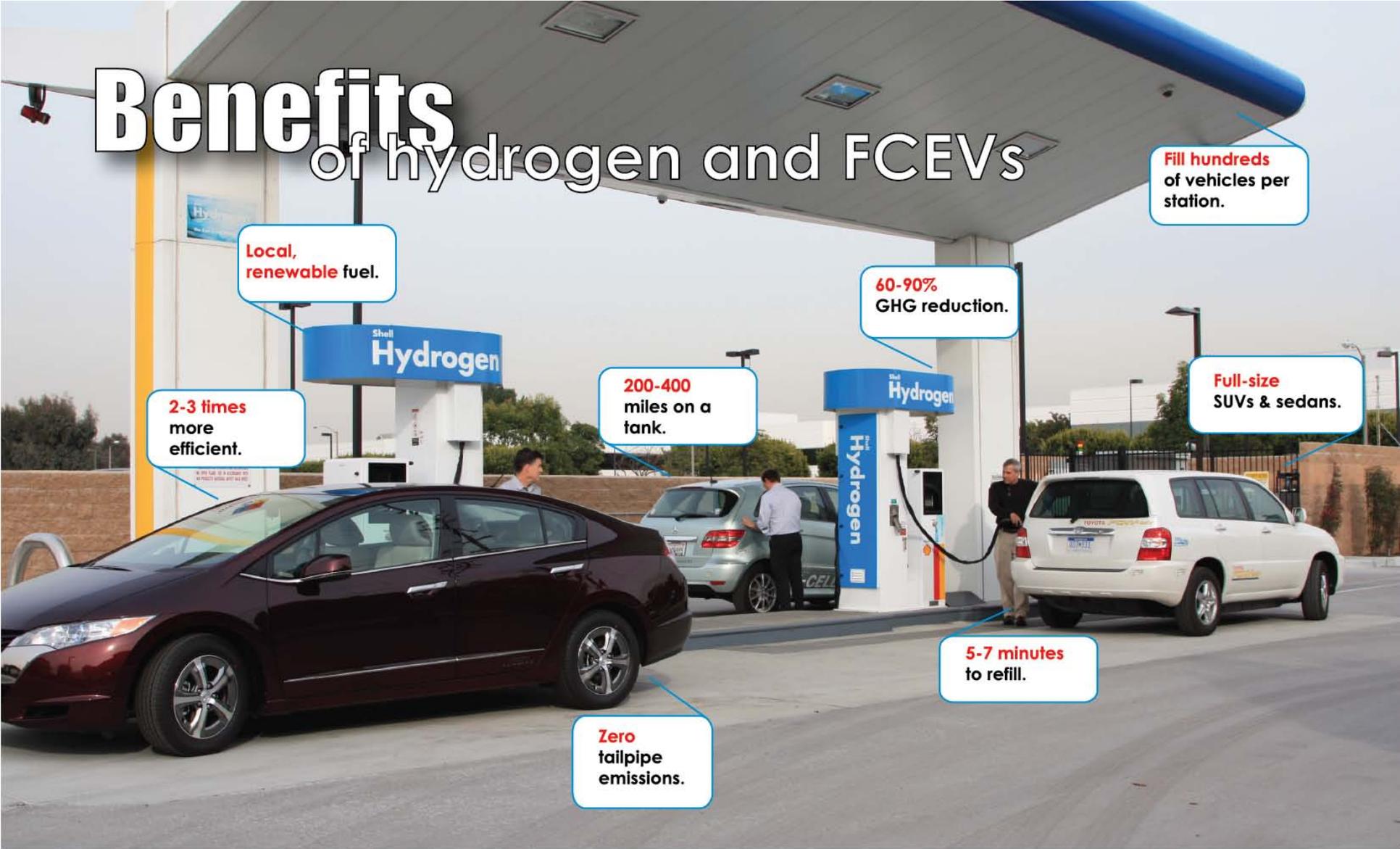
Zero tailpipe emissions.

60-90% GHG reduction.

5-7 minutes to refill.

Fill hundreds of vehicles per station.

Full-size SUVs & sedans.



## Station Information

Address: 25800 S. Western Ave.  
Harbor City, CA 90710

Station Status: PUBLIC

Hours of Operation: 24/7

PIN Required: Yes

Fuel Pressures: 5,000/10,000 psi

Supply Capacity: 100 kg/day

Fuels: Up to 25 cars/day

Fuel Price: Contract

Operations Contact: Mebtahi Station Services  
25800 S. Western Ave, Harbor City,  
CA 90710

Market: Cluster - Torrance/Coastal Cities

Open to Public: April 2013



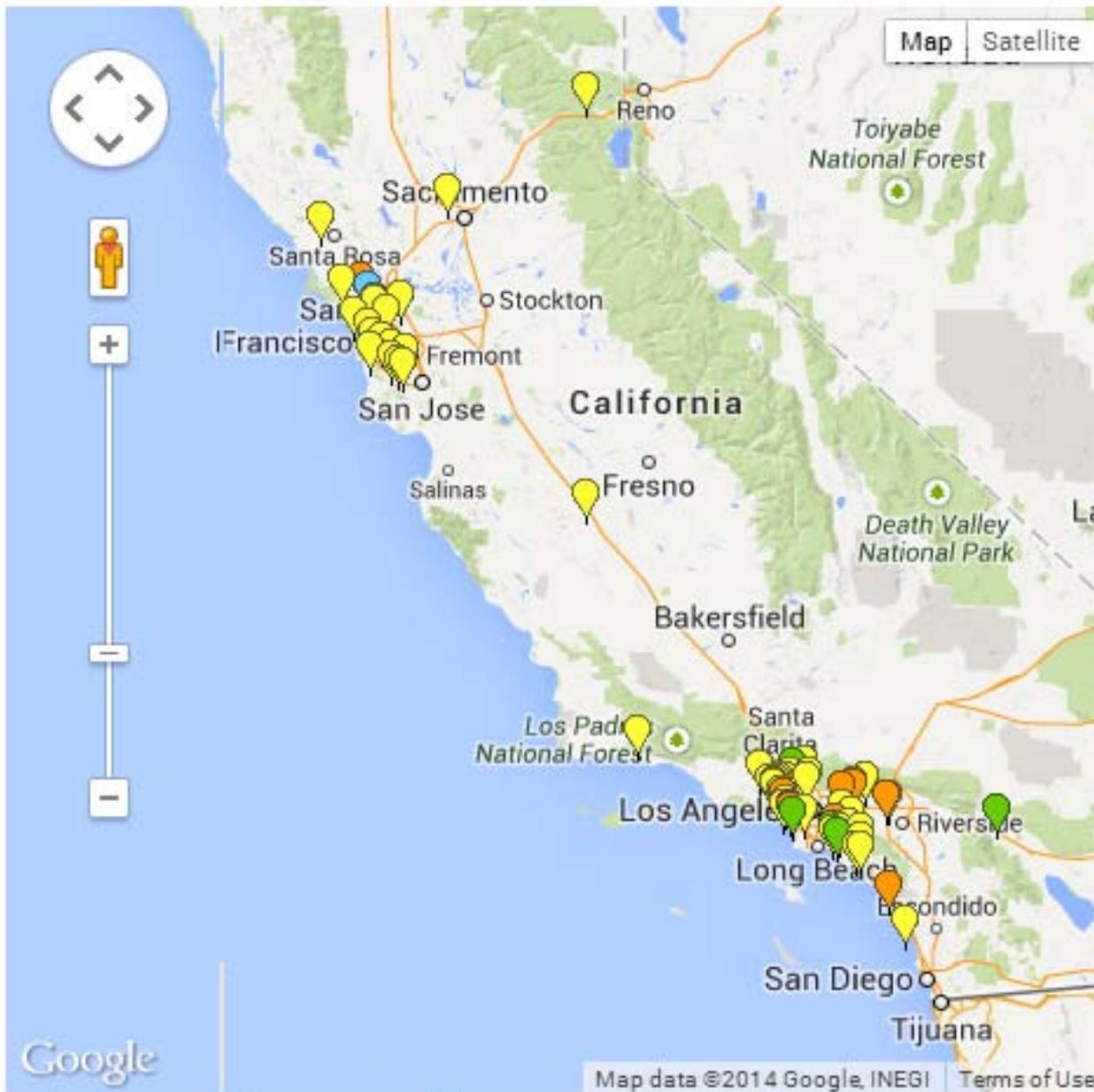
## Hydrogen Supply/Equipment

- Hydrogen Source/Storage:
  - Gaseous high-pressure hydrogen delivered by truck
  - 64 kg H<sub>2</sub> storage at 14,000 psi (permanent)
  - 230 kg H<sub>2</sub> storage at 7,500 psi (trailer)
- Dispenser: Air Products
- Nozzle: WEH

## Design/Construction/O&M Service Contractors

- Designed by: Air Products/GP Strategies
- Constructed by: Air Products/  
GP Strategies
- Installed by: Air Products/GP Strategies
- Maintained by: Air Products





# Early markets for hydrogen stations

# Southern CA Hydrogen Stations

## Open

- Burbank
- Fountain Valley – OCSD
- Irvine – UC Irvine
- Los Angeles - Harbor City
- Los Angeles - West LA 1
- Newport Beach – Shell
- \*Thousand Palms – SunLine Transit
- Torrance – Shell

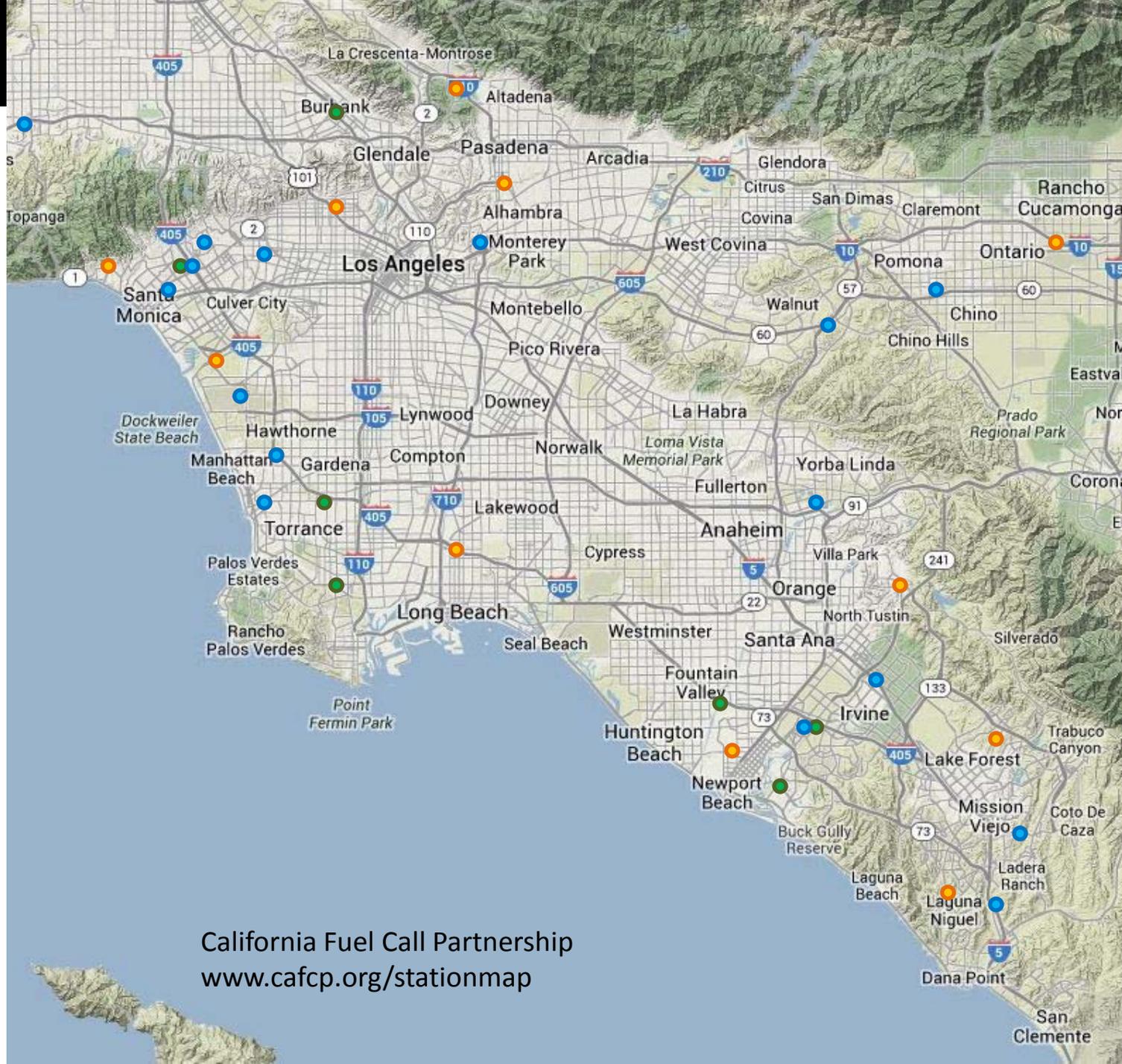
## In Development

- Anaheim
- Chino (upgrade)
- Diamond Bar (upgrade)
- Irvine - UC Irvine (upgrade)
- Irvine - Walnut Ave.
- Lawndale
- Los Angeles - LAX
- Los Angeles - West LA 2
- Los Angeles – Westwood
- Los Angeles - Woodland Hills
- Los Angeles – Cal State LA
- Los Angeles - Beverly Blvd.
- Mission Viejo
- Redondo Beach
- San Juan Capistrano
- Santa Monica 1

## NOPA

- \*Coalinga
- \*Costa Mesa
- La Canada Flintridge
- Laguna Niguel
- Lake Forest
- Long Beach
- Los Angeles - 9
- Los Angeles -10
- Ontario
- Orange
- Pacific Palisades
- \*Riverside
- \*San Diego
- \*Santa Barbara
- South Pasadena

\*Not shown on map



California Fuel Cell Partnership  
[www.cafcp.org/stationmap](http://www.cafcp.org/stationmap)



## SECTION 2: COMMUNITY ENGAGEMENT

### Is your Community Hydrogen Ready?

- Is your city in or near one of the clusters, a connector or a destination area?
- Does your city have an existing gasoline or natural gas station with a vacant area of about 20x40 feet?
- Does your city offer incentives, such as free parking, for electric vehicles, fuel cell and hydrogen?
- Does your city's zoning requirement specify that service stations dispense gasoline, or does the requirement refer to fuel?
- Has your fire department or permitting department already attended hydrogen and fuel cell training?
- Is your air quality management district involved with local transportation planning? Does your city have an air quality blueprint?
- Does your city already have an EV Readiness plan and partnerships?
- Are you aware of the funding and incentive opportunities?

# SECTION 3: PLANNING AND PERMITTING



## Regulations, Codes, and Standards (RCS) Template for California Hydrogen Dispensing Stations

C. Rivkin, C. Blake, R. Burgess, W. Buttner, and M. Post

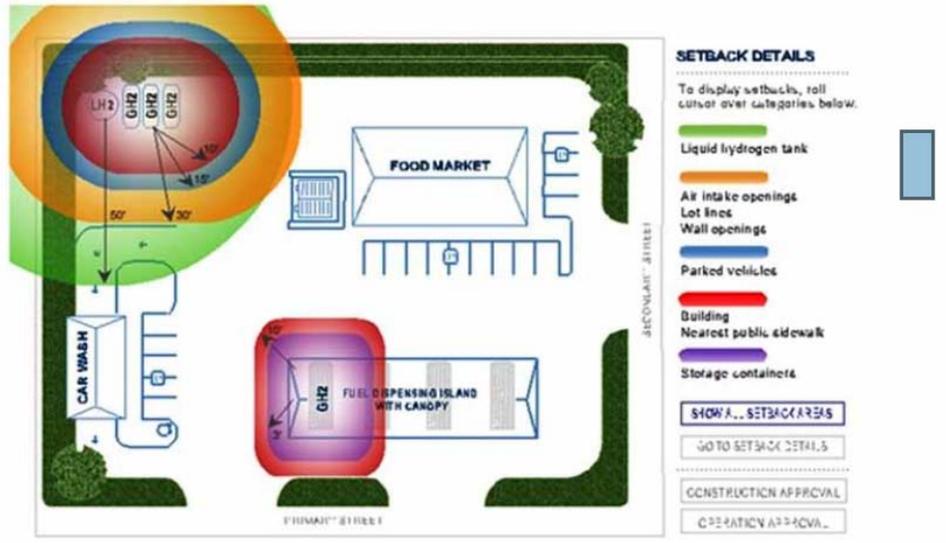
NREL is a national laboratory of the U.S. Department of Energy, Office of Efficiency & Renewable Energy, operated by the Alliance for Sustainable Energy

**Technical Report**  
NREL/TP-5600-56223  
November 2012

Contract No. DE-AC36-08GO28308

### Construction and Setbacks

Among many considerations for code officials, the layout of a hydrogen fueling station must meet specific requirements for construction setbacks. This figure provides an example of a hydrogen fueling station layout, along with some of the required codes and standards.





LUCAS OIL  
www.lucasoil.com

Rescue

Rescue

Rescue

E44

LKS

218

FCEV  
Fuel Cell Electric Vehicle

SAFARI

# SECTION 4: TEMPLATES AND GUIDES

## Plan the Work

Approach		Examples of Actions
Recognize hazards and define mitigation measures	<input type="checkbox"/>	Identify risks such as flammability, toxicity, asphyxiates, reactive materials, etc.
	<input type="checkbox"/>	Identify potential hazards from adjacent facilities and nearby activities
	<input type="checkbox"/>	Address common failures of components such as fitting leaks, valve failure positions (open, closed or last), valves leakage (through seat or external), instrumentation drifts or failures, control hardware and software failures and power outages
	<input type="checkbox"/>	Consider uncommon failures such as a check valve that does not check, relief valve stuck open, block valve stuck open or closed and piping or equipment rupture
	<input type="checkbox"/>	Consider excess flow valves/chokes to size of hydrogen leaks
	<input type="checkbox"/>	Define countermeasures to protect people and property
	<input type="checkbox"/>	Follow applicable codes and standards
Isolate hazards	<input type="checkbox"/>	Store hydrogen outdoors as the preferred approach; store only small quantities indoors in well-ventilated areas
	<input type="checkbox"/>	Provide horizontal separation to prevent spreading hazards to/from other systems (especially safety systems that may be disabled), structures and combustible materials
	<input type="checkbox"/>	Avoid hazards caused by overhead trees, piping, power and control wiring, etc.
Provide adequate access and lighting for activities including	<input type="checkbox"/>	Operation, including deliveries
	<input type="checkbox"/>	Maintenance
	<input type="checkbox"/>	Emergency exit and response

Zero-emission vehicles, including those powered by fuel cells, will play an important role in improving California's air quality, reducing greenhouse gases that contribute to climate change, and increasing energy security while promoting a green economy. To get there, we need to invest in infrastructure, including an early network of hydrogen stations that will provide convenient and reliable fueling for the first customers that purchase fuel cell electric vehicles.

