

# Hydrogen Station Requirements 2012

Robert Boyd - Boyd Hydrogen , LLC

The Hydrogen Cycle: fuel for electro-mobility





# BOYD Hydrogen



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|--------------|--|
| 2003-2004    | Developed Pacific Spirit Station for Ford, Fuel Cells Canada, Natural Resources Canada, NRC-IFCI and BOC |
| 2004-2005    | Developed City of Taylor fueling station for Ford, BP, BOC   |
| 2004 to 2006 | Developed indoor fueling system to support FC fork lifts for BOC / Linde                                 |
| 2002 to 2012 | Active support of developing codes and standards for H <sub>2</sub> fueling at SAE, CGA, CSA, ICC, NFPA  |

## The Hydrogen Cycle: fuel for electro-mobility

More info: [Bob@BoydH2.com](mailto:Bob@BoydH2.com) 925.330.6838 PO Box 2273 Orinda, CA 94563



# Top Priorities in 2012

- \* Need to build stations that are **installed and put into operation quickly**
- \* Stations must be publicly accessible : **public sale, no (or easy) user agreements.**
- \* Need stations that **dispense H70 with reasonable speed: 1 to 2 kg per minute** so that the consumer can experience 3 to 7 kg fills in about 5 minutes
- \* Consumers need lot of stations: options and places to fuel



# Station Capacity

Station Size	Cars per day	Kg per day	Dispenser Revenue \$1000 per year
Small	5 to 10	25 to 50	\$37 to \$140
Medium	10 to 30	50 to 150	\$140 to \$400
Large	30 to 120	150 to 600	\$400 to \$1,700

- \* Dispenser fills are average of 5 kg per fill
- \* Dispenser retail price of hydrogen : \$10 per kg



# Fueling Performance

- \* 700 bar service pressure or H70 service is required: H30 is OK for buses and fork lifts, but fuel for 2015 FCVs is H70
- \* Dispenser must be capable of back to back fills with some flexibility on fueling time allowed for sequential fills and first fill of the day.
- \* Fast fueling requires cooling and use of a fueling protocol that meets intent of SAE J-2601.
- \* Alternative fueling protocols can be approved that meet requirements of CSA HVG-4.3

**Certify stations to CSA HGV-4.3 to validate compliance with the intent and performance requirements of SAE j2601**



# Dispenser Performance Certification

## retail sales and consumer protection

- \* to validate SAE j2601 compliance station operator must **certify station dispenser performance to CSA HGV-4.3**
- \* To certify the **dispenser meter accuracy** and allow for retail sales station operator must validate the dispenser accuracy using test vessels that meet **DMS and NIST** requirements.
- \* To **certify fuel quality** at the dispenser station operator must hire a third party test company to collect samples at the nozzle and analyze for compliance with **SAE J2719**



# Permitting Challenges

- \* NFPA-2 Hydrogen Technologies Code was just published in 2013 and has good (but not perfect) support for H<sub>2</sub> vehicle fuelling. Target for good code: 2015
- \* ICC Model Fire and Building Codes are basis of CFC, CBC, and on a 3 year change cycle. Target for good code: 2015
- \* 2010 California Fire Code, Building and Mechanical codes are flawed with respect to support for H<sub>2</sub> vehicle fuelling

**expect permitting challenges on each installation until about 2016 and require outreach to code officials (AHJ)**



# Renewable Hydrogen

- \* The use of renewable resources to manufacture hydrogen is a noble effort but adds unneeded cost to the early demonstration projects
- \* Large scale renewable hydrogen projects makes sense when the demand is large : 1 million cars = 1000 tons per day
- \* H<sub>2</sub> produced from Natural Gas and water enable the FCV to operate at close to half the net (wells to wheels) GHG emissions of a comparable CNG vehicle
- \* Need to encourage renewable H<sub>2</sub> production but not for small scale fueling projects where a renewable requirement is huge cost penalty
- \* It is unfair to burden H<sub>2</sub> fueling project with a renewability requirement when CNG and BEV deployments have no equivalent



# Summary of key points for CEC 2012 Hydrogen Station workshop

- \* Need to build stations that are **installed and put into operation quickly**
- \* Stations must be publicly accessible : **public sale of hydrogen, easy (or no) user agreements.**
- \* **H70 fast fill** with dispenser certification for **CSA HVG-4.3 compliance**
- \* **expect permitting challenges** on each installation until about 2016 and plan for outreach to code officials (AHJ)
- \* Size of station may not be as important as **station performance** and **commitment of proponent** to deploy and operate station
- \* encourage renewable H<sub>2</sub> generation, but **do not burden small fuel station projects with renewable requirements**