

Historical Perspectives for Hydrogen Safety, Regulations, Codes and Standards (California and U.S.A.)

Jennifer Hamilton



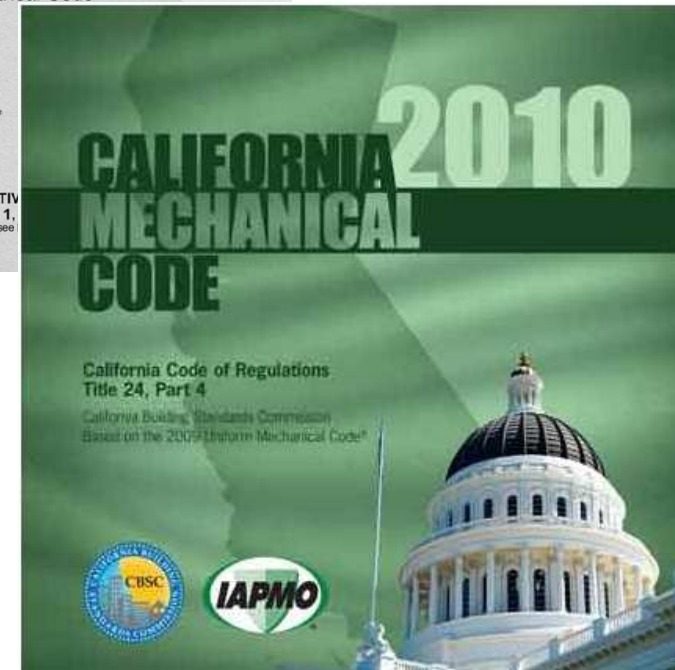
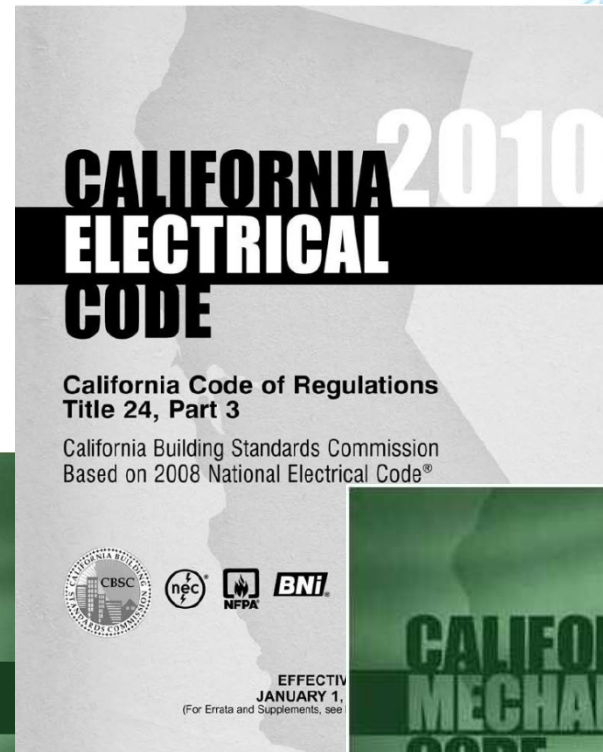
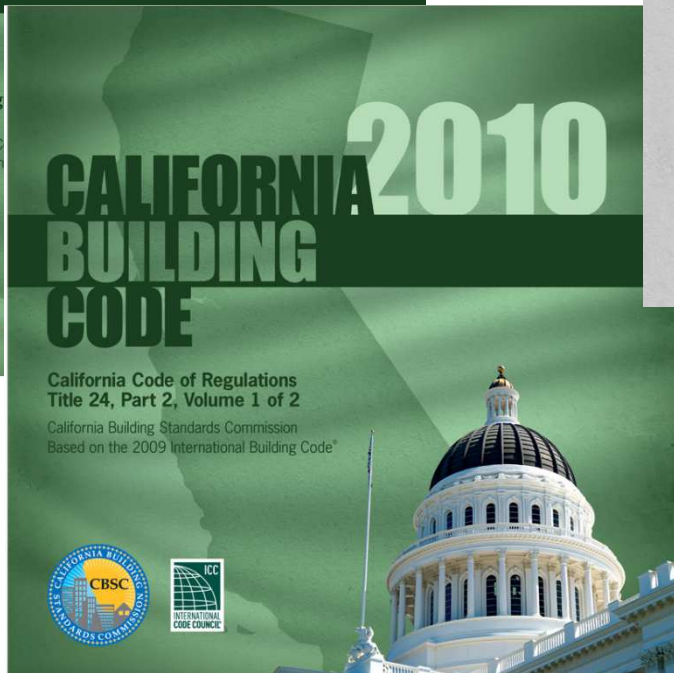
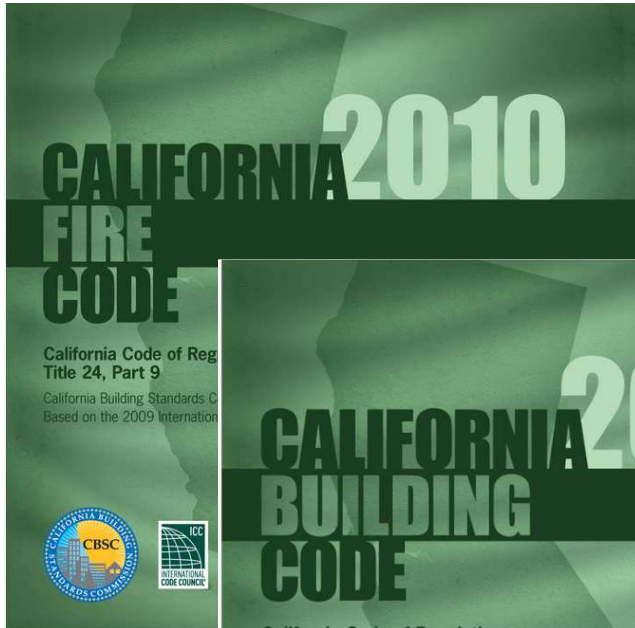
ICHS2013



11 September, 2013



CA overview



CaFCP hydrogen fueling station

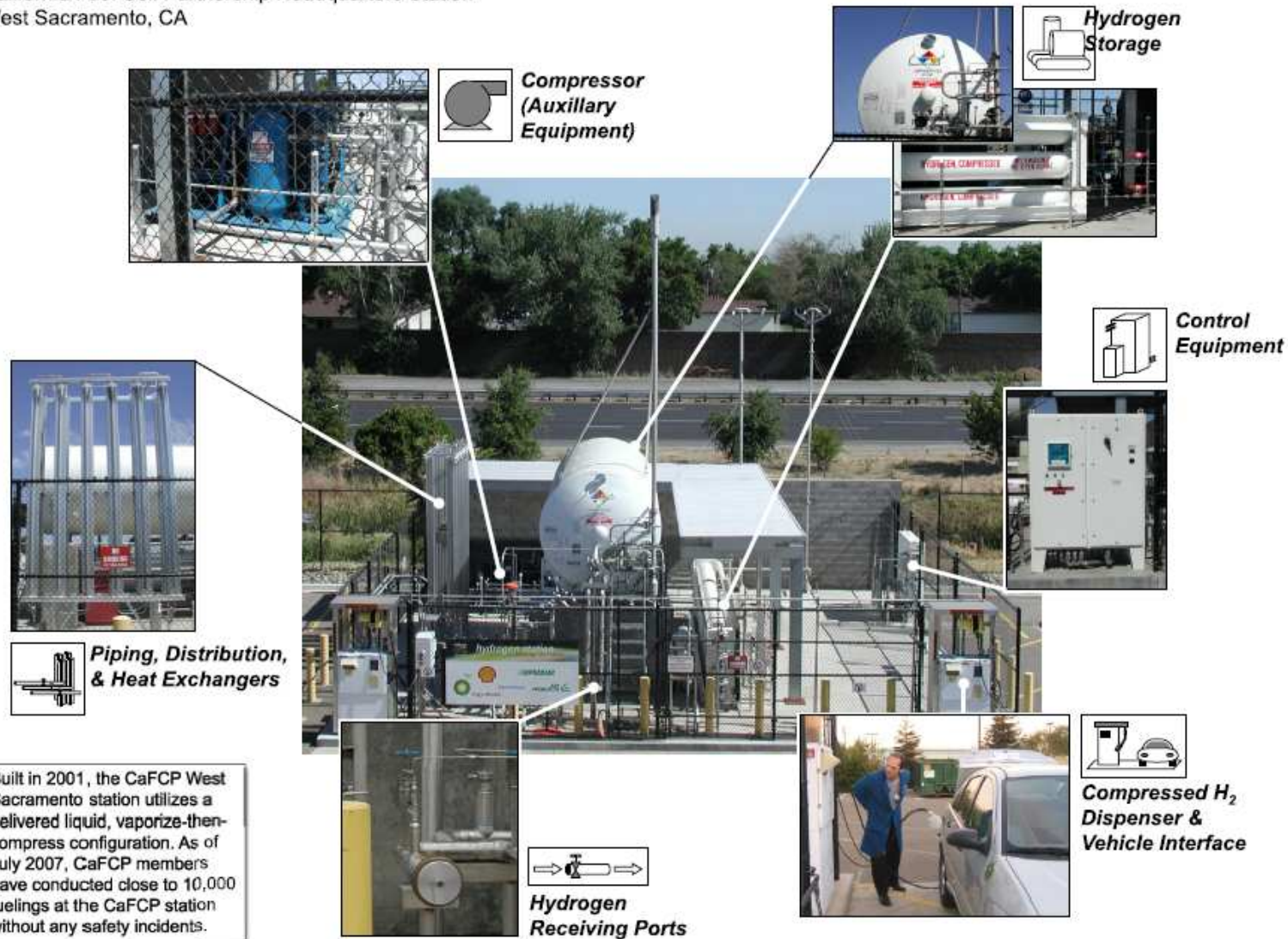


- West Sacramento
 - » Second hydrogen station built in Ca
 - » Built by Texaco, BP, Chevron, Shell, Air Products, Praxair
- Jurisdiction: City of West Sacramento and West Sacramento Fire Department
- To be decommissioned October, 2013

West Sacramento Station



Typical Hydrogen Fueling Station Elements - sample layout
 California Fuel Cell Partnership Headquarters Station
 West Sacramento, CA



Built in 2001, the CaFCP West Sacramento station utilizes a delivered liquid, vaporize-then-compress configuration. As of July 2007, CaFCP members have conducted close to 10,000 fuelings at the CaFCP station without any safety incidents.



Applicable C&S



- Then...
 - » 2001 California Fire Code, Title 24, Part 9
 - Article 29: Repair Garages
 - Article 52: Motor Vehicle Fuel Dispensing Stations
 - Article 74: Compressed Gases
 - Article 75: Cryogenic Fluids*
 - Article 80: Hazardous Materials
- As of January, 2014
 - » 2013 California Fire Code, Title 24, Part 9
 - Chapter 23: Motor Fuel-Dispensing Facilities and Repair Garages
 - Chapter 53: Compressed Gases
 - Chapter 55: Cryogenic Fluids*
 - Chapter 58: Flammable Gases and Flammable Cryogenic Fluids*

* If the station stores LH2



Applicable C&S



- Then...
 - » 1998 California Building Code, Title 24, Part 2
 - Part 1 for any 'Green Building' standards
 - » 2000 California Electrical Code, Title 24, Part 3
 - » 2001 California Mechanical Code, Title 24, Part 4
- Current (as of Jan. '14)
 - » 2010 California Building Code, Title 24, Part 2
 - Part 1 for any 'Green Building' standards
 - » 2010 California Electrical Code, Title 24, Part 3
 - » 2010 California Mechanical Code, Title 24, Part 4

Model Code Developers



- ICC
 - » International Fire Code: California's (and most state's) model fire code
 - Some use NFPA 1 as model fire code (Northeast and Hawaii)
 - » Currently in a revision cycle for 2015
 - Input includes topics on hydrogen, fueling stations and repair facilities
 - Ca to adopt this as the 2016 CFC, effective January 1, 2017
- NFPA
 - » CFC has referenced NFPA 50 A/B, then NFPA 52 and 55
 - » All hydrogen-related items from NFPA 52 have now been removed
 - » NFPA 55 is currently in revision cycle, as well
 - » NFPA 2, the Hydrogen Technologies Code, includes excerpted hydrogen material from NFPA 52 and other documents, as well as references to other NFPA documents
 - The 2011 version is undergoing revision for a 2015 edition



Code adoption



- California: IFC = model fire code
- This does not guarantee uniform code adoption throughout each jurisdiction in the state
- Depending upon a jurisdiction's code adoption cycle, they may be using previous versions of the CFC
 - » Or in other states in the US
- Jurisdictions can also amend the CFC during adoption
- Potential issues with permitting a station

CFC amendment example: City of Merced, CA



- » “We are working on code adoption and was wanting to see if anyone is making an amendment to not allow Sky Lanterns and if they would be willing to share their language.”

Reply from County of Los Angeles Fire Department



“Here is one I drafted and, below that, how Orange County proposes to handle the issue. I’m still considering the language I drafted.

LA COUNTY DRAFT:

FLOATING LUMINARY is an unpowered floating air borne device containing open flaming or smoldering material capable of causing ignition to combustibles it may come in contact with. Floating luminaries may also be referred to as sky lanterns, flying lanterns, sky candles and wish lanterns.

308.1.6.1.1 Floating luminary use. The use or release of a floating luminary is prohibited.

Exception: When a permit is issued by the Fire Code Official for use or release of a floating luminary for ceremonial, educational, or research purposes and where approved safeguards are used to prevent unintended ignition of combustibles. Floating luminary use or release shall be allowed only at a specific location and during prescribed weather conditions.

ORANGE COUNTY DRAFT:

SKY LANTERN. An airborne lantern typically made of paper, Mylar, or other lightweight material with a wood, plastic, or metal frame containing a candle, fuel cell, or other heat source that provides buoyancy.

326 Sky Lanterns or similar devices. The ignition and/or launching of a Sky Lantern or similar device is prohibited.

Exceptions:

Upon approval of the fire code official, sky lanterns may be used as necessary for religious or cultural ceremonies providing that adequate safeguards have been taken as approved by the fire code official. Sky Lanterns must be tethered in a safe manner to prevent them from leaving the area and must be constantly attended until extinguished.

CFC amendment example: Huntington Beach FD



Group,

In preparation for the upcoming code adoption, we are considering the following amendments:

113.3 Work Commencing before permit issuance, Amended. Any person who commences any work, activity or operation regulated by this code before obtaining the necessary permits shall be subject to an additional fee **that is equal to the original permit fee** , which shall be in addition to the required permit fees.

Rationale - Existing code language indicates that the governing authority may charge an additional fee for work commencing before permit issuance. The purpose of this amendment is to clarify the amount of the fee that will be charged in Huntington Beach if work commences without the required permit. The fee will offset the required additional city resources to back track, investigate and review projects. The fee will also serve as deterrent for unpermitted work which will lead to more code compliant structures.

Section 510.6.1 Testing and proof of compliance, Amended.

5. At the conclusion of the testing, a report, which shall verify compliance with Section 510.5.4, shall be submitted to the fire code official. **In addition, one complete copy of the report shall be posted in the building, on the wall immediately adjacent to the Fire Alarm Control Panel.**

Rationale - The Fire Department is charged with responsibility to check on the annual testing. By requiring the posting of a copy of the test results on the alarm panel this may be done during the annual inspection and does not require the occupants to retrieve the information from a business office (if they can find it at all). It also gives the inspection crews (who will be responding to the location in the event of a fire) to see the status of the system and be more aware of potential problem areas during their annual inspections.

Anyone out there have something similar? If so, please respond directly back to me.



2013

ZEV Action Plan

A roadmap toward 1.5 million zero-emission vehicles
on California roadways by 2025



Governor's Interagency Working Group on
Zero-emission Vehicles

Governor Edmund G. Brown Jr.
February 2013



2013 ZEV Action Plan



The Governor's Executive Order establishes several milestones organized into three time periods:

By 2015

- The state's major metropolitan areas will be able to accommodate ZEVs through infrastructure plans and streamlined permitting
- Private investment and manufacturing in the ZEV sector will be growing
- The state's academic and research institutions will contribute to ZEV market expansion by building understanding of how ZEVs are used

By 2020

- The state's ZEV infrastructure will be able to support up to 1 million vehicles
- The costs of ZEVs will be competitive with conventional combustion vehicles
- ZEVs will be accessible to mainstream consumers
- There will be widespread use of ZEVs for public transportation and freight transport

By 2025

- Over 1.5 million ZEVs will be on California roadways and their market share will be expanding
- Californians will have easy access to ZEV infrastructure
- The ZEV industry will be a strong and sustainable part of California's economy
- California's clean, efficient ZEVs will annually displace at least 1.5 billion gallons of petroleum fuels

The Executive Order also directs state government to begin purchasing ZEVs. In 2015, 10% of state departments' light-duty fleet purchases must be ZEVs, climbing to 25% of light duty purchases by 2020.

2013 ZEV Action Plan



Streamline permitting of hydrogen stations

Develop permit standards for hydrogen stations to enable local governments to reduce the time and cost associated with constructing a hydrogen station.

OPR

2013

Consider designating a permitting ombudsman to actively support local governments as they review, approve and permit hydrogen stations. The ombudsman would act as a subject matter expert and provide technical support about codes, standards and safety matters for authorities having jurisdiction.

CARB

2013

- Ca Office of Planning and Research
- Funding and job description for an Ombudsman in the Governor's
 - » Mediate between government and industry
 - » Work with State Fire Marshal's office for items related to safety/permitting

ZEV Readiness Guidebook



Streamline permitting of hydrogen stations

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CARB

2013

- A community readiness guide with resources and information (for plug ins and fuel cells)
- Part of the effort to ‘streamline’ permitting
 - » [Regulations, Codes, and Standards \(RCS\) Template for California Hydrogen Dispensing Stations](#) (NREL)
- Due to be released in the coming weeks
- ZEV Toolkits to follow from the California Air Resources Board

Role of the State FM in ZEV AP



Specific Strategies and Actions to Complete Needed Infrastructure and Planning	Lead Agency	Supporting Agency	Time-frame
Provide training and education to local building and fire inspectors about hydrogen stations and support development of codes and standards that regulate this infrastructure on a statewide basis.	OFSM		2013

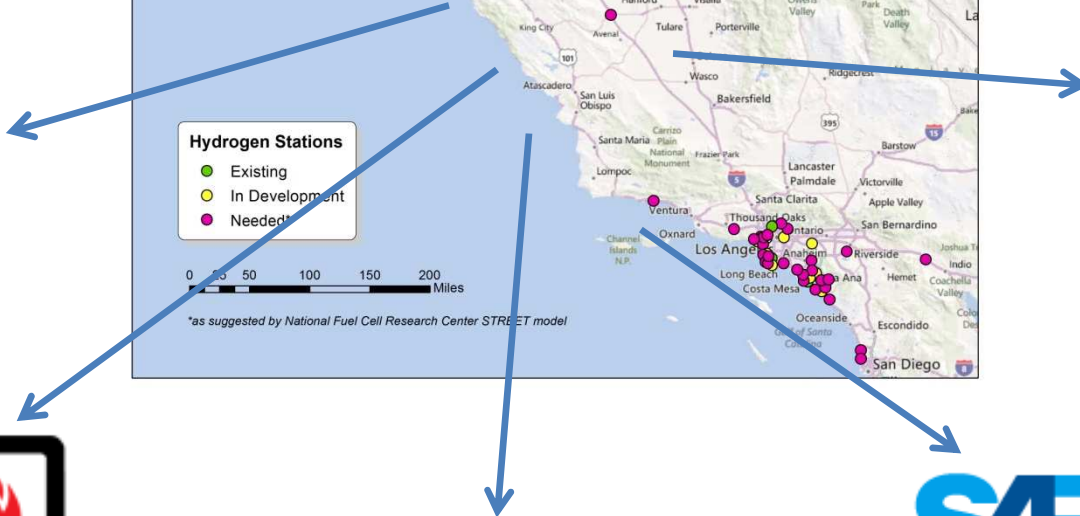
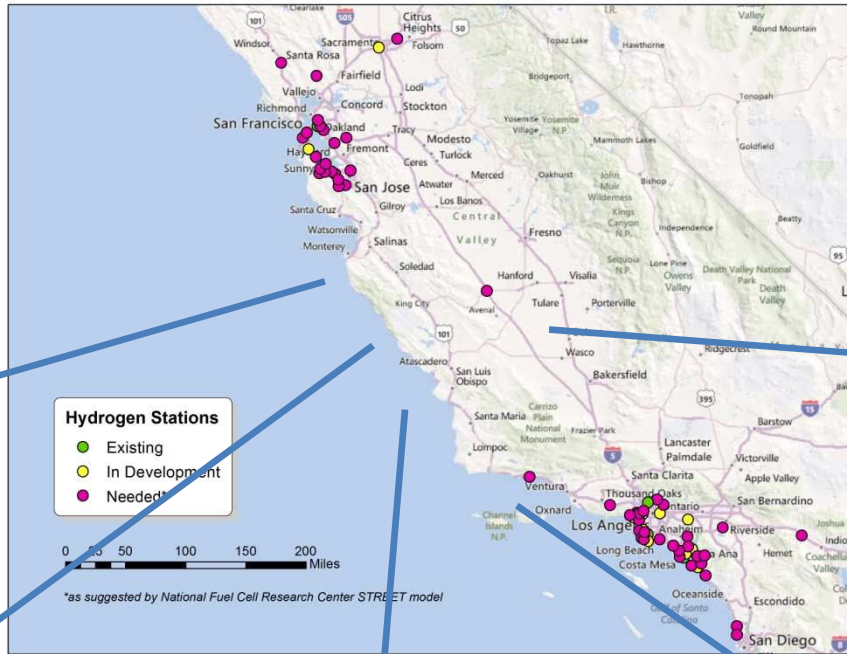
- CaFCP working with OSFM Division Chief, Code Development and Analysis Division on updated hydrogen language for Ca
 - » Supplement to include new hydrogen language from the 2015 IFC: effective July 1, 2015
- Eventually, reference 2015 NFPA 2 in the 2018 IFC, adopted into 2019 CFC, enforced January 1, 2020
 - » Amend the model fire code (i.e. 2016 CFC)
 - » Another supplement effective July, 2018



CaFCP activities



- Emergency Responder and Permitter/AHJ education & outreach
 - » With the U.S. DOE & National Renewable Energy Lab
 - » Developing a National ER Education Program through Pacific Northwest National Lab
- Community Readiness
- Legislative Outreach
- Retail Station Developers
- Safety, Codes & Standards development/input
 - » U.S. DOE Codes & Standards Tech Team
 - » FCHEA National Hydrogen & Fuel Cells Codes & Standards Coordinating Committee, Transportation Working Group,
 - » Hydrogen Codes Task Force





Specific documents



- NFPA 2- Hydrogen Technologies Code
- CSA HGV 4-series (station components and systems)
- ISO TC 197- new WG for hydrogen stations, other station component work items
- ICC- IFC
- CDFA, DMS- metering
- CA OSFM- CFC

Support harmonization with International C&S
development

Upcoming Codes & Standards for California/USA



- IFC
 - » Undergoing revision (2015 version)
 - » 2015 IFC → 2016 CFC (effective January, 2017)
 - » Ca to reference new IFC language in a supplement effective July, 2015

- NFPA 2
 - » Current version = 2011
 - Referenced in CFC
 - » Under revision for 2015 (includes new H2 language and chapters previously 'reserved')
 - » Goal: reference NFPA 2 in the IFC, for adoption into the CFC (approximately 2020)
 - Very possible to have enforceable language prior to 2020
 - Jurisdictions can use NFPA 2 as an 'alternate means and methods'

Looking forward



- Installing hydrogen facilities will become ‘easier’ and ‘faster’
 - » More experience of AHJ’s
 - » CFC will reference NFPA 2
 - » Technology advancements
 - » More ‘standardized’ design





In the mean time continue...



- Outreach and education
 - » Emergency responders
 - » Permitting officials
 - » General public
- Assisting station developers
- Readyng the market
- Readyng communities
- Sharing experience
- Collaborating and harmonizing



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