

# A National Set of Hydrogen Codes and Standards for the US



3<sup>rd</sup> International Conference  
on Hydrogen Safety

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# Overview

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The US has a national set of codes and standards that address the use of hydrogen technologies

These documents are published by several organizations and are not all directly adopted by government authorities

The US Department of Energy (DOE) has acted as the central organizing group to identify these documents and present them as a coherent and integrated set of requirements

# Building a Hydrogen Infrastructure

Need hydrogen dispensing stations and other infrastructure projects

- *Hydrogen dispensing can be added to existing stations*
  - Requires review and approval by fire and building officials
  - To perform this review and approval, codes and standards are required that specifically address hydrogen usage
  - Without hydrogen specific codes and standards it is difficult to move the review and approval process forward

# Fire Safety and the Built Environment

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Hydrogen infrastructure projects require review and approval by fire and building officials

Construction projects are generally not regulated at the Federal (national) level in the US

These projects may be subject to Federal requirements but they are generally regulated at the a level of government below the Federal level

- State
- County
- City

# The DOE Role



DOE cannot promulgate a national set of requirements for hydrogen infrastructure projects

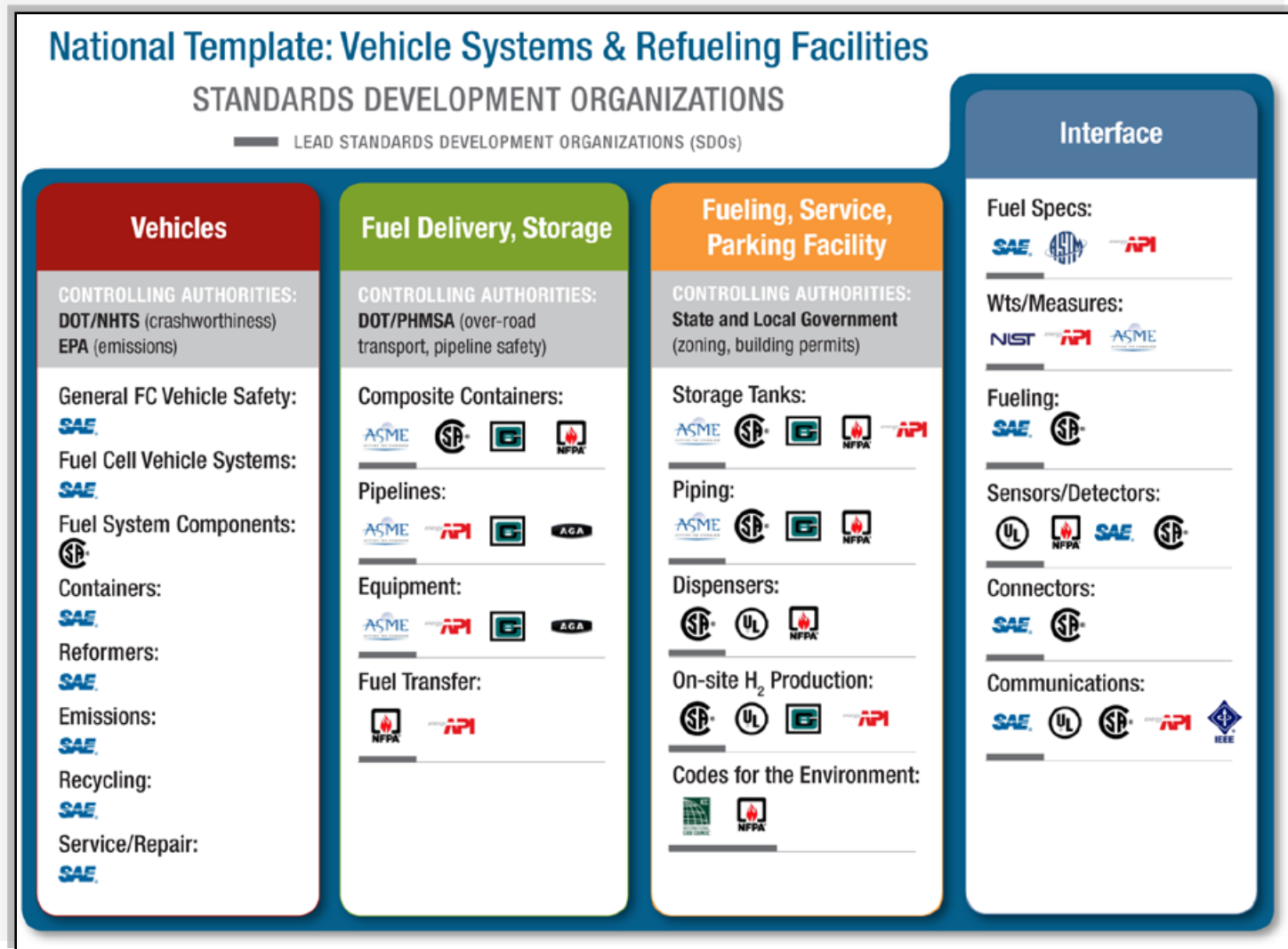
DOE can identify the codes and standards for hydrogen technologies and distribute this information through the internet and regional workshops

DOE can support codes and standards development projects to fill gaps in the hydrogen codes and standards

DOE has worked with Standards Development Organizations (SDOs) to define a national template of hydrogen codes and standards

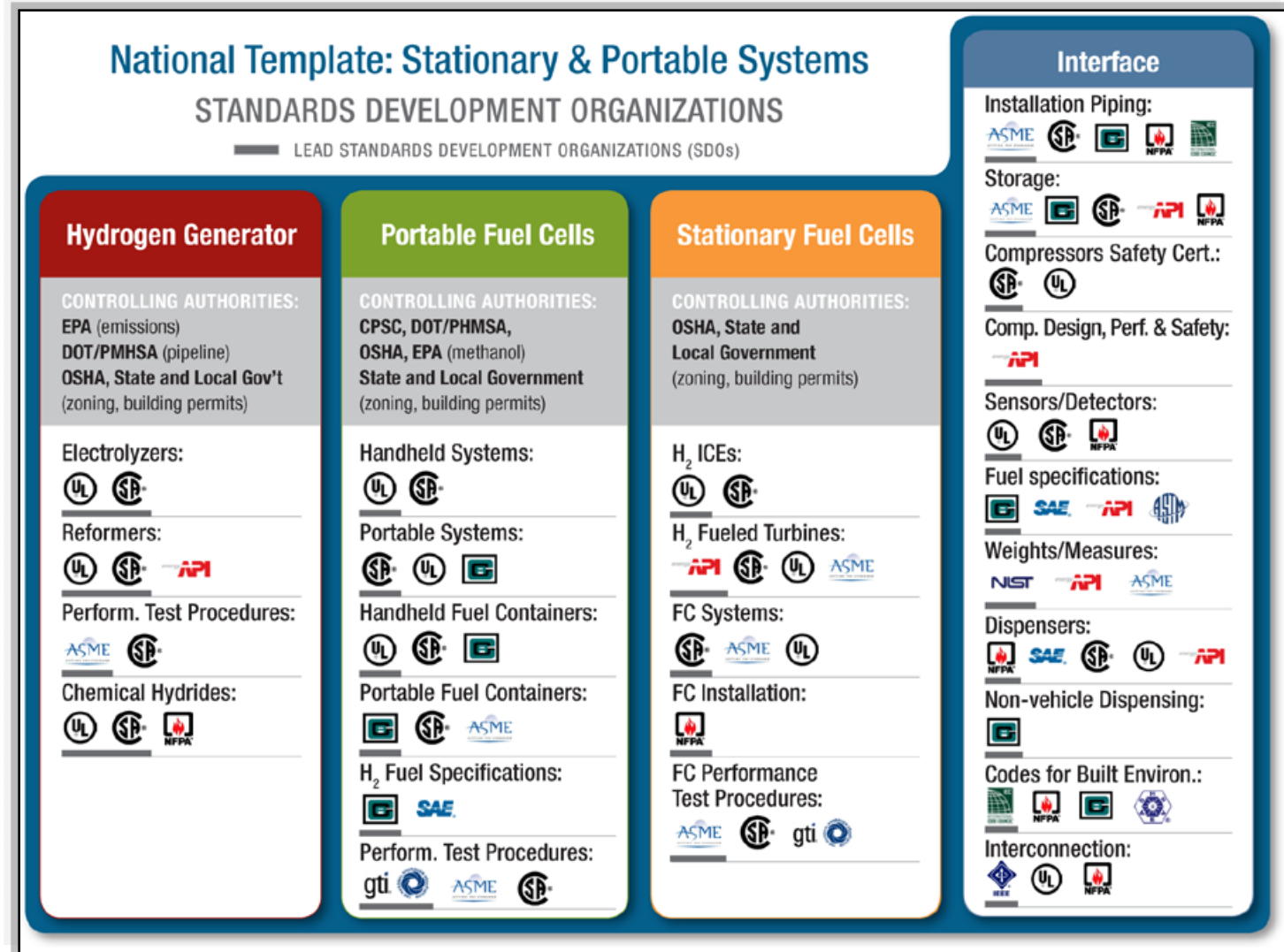
# National Template of Codes and Standards

DOE assisted in the development of a national C & S template



# National Template of Codes and Standards

## Second template for portable systems



# Key Codes and Standards Accomplishments

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Hydrogen dispensing material added to the International Fire Code

Hydrogen dispensing requirements added to NFPA 52 Code

Hydrogen component standards being completed by CSA America in 2010

Hydrogen fuel quality standards being promulgated by ISO and SAE in 2010

Risk informed code requirements added to NFPA hydrogen documents

NFPA 2 Hydrogen Technologies Code to be promulgated in 2010



# Current Status

## Regulatory Hierarchy of H<sup>2</sup> Codes & Standards

### Level 1:

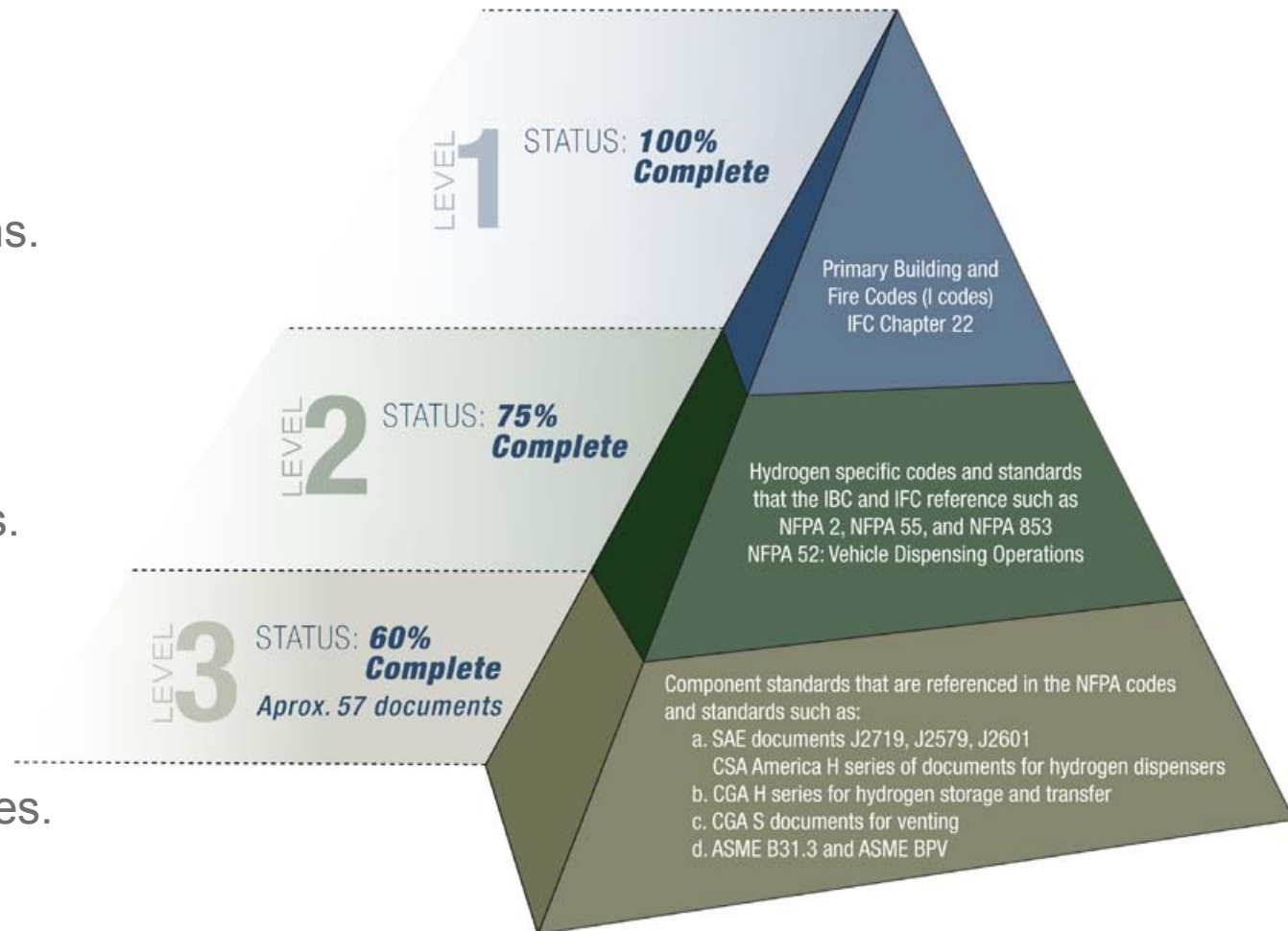
Building and fire codes directly adopted by jurisdictions.

### Level 2:

Hydrogen specific codes referenced in building and fire codes.

### Level 3:

Component standards referenced in hydrogen specific codes.



# Example of Dispensing

## Hydrogen Behavior

- Physical properties
- Flammability and transport
- Material compatibility
- Detection

## Hydrogen Fuel Infrastructure

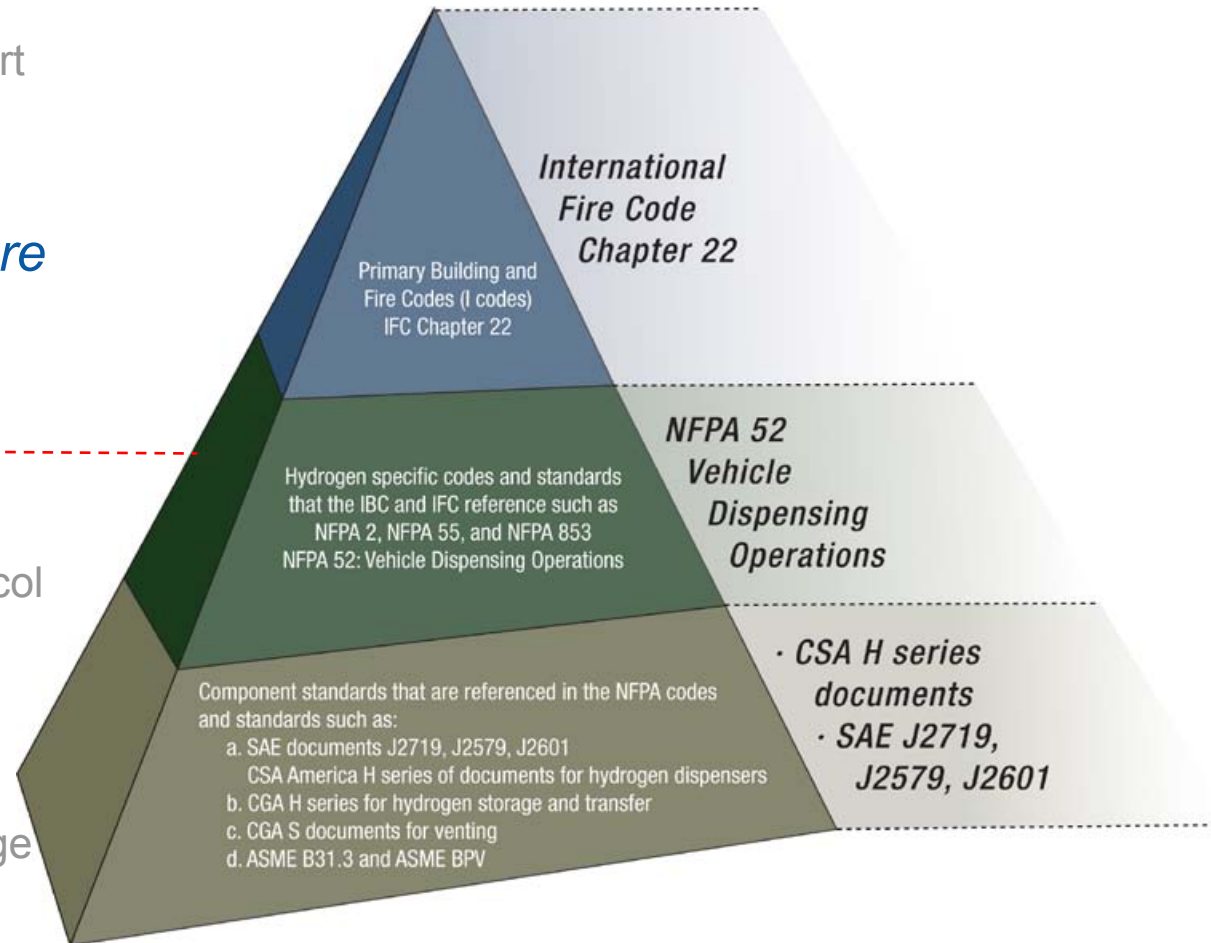
- Production
- Distribution and delivery
- **Fueling station**

## Fuel-Vehicle Interface

- Fueling nozzle and protocol
- Fuel quality
- Cross-cutting issues

## Hydrogen Vehicle

- Onboard hydrogen storage
- Onboard fuel handling
- Parking requirements



# Application of Codes and Standards

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The State of California adopts (and modifies) the International Building Code (IBC) and International Fire Code (IFC)

The IFC refers to NFPA 55 for hydrogen storage and NFPA 52 for hydrogen dispensing in addition to containing specific dispensing requirements in Chapter 22 of the IFC

NFPA 52 and NFPA 55 refer to CSA and UL standards for hydrogen system components

# Major Codes and Standards Issues

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More operating data are needed to identify systems issues and codes and standards requirements that would address these issues

Better characterization of indoor hydrogen dispensing, operations, and storage hazards

More specific requirements for operations and maintenance

Evaluate liquid storage requirements as was done gaseous hydrogen storage requirements

Improve commercially available sensor technologies

Evaluation of high-pressure hazards particularly in locations that are accessible to the general public

Continue outreach activities to get codes and standards information to project developers and other interested parties