

CENTER FOR
Hydrogen
SAFETY
Connecting a Global Community

Global Hydrogen Safety Codes and Standards

Jennifer Hamilton
Program Manager:
Safety, Education, Codes & Standards
July 21, 2021





CaFCP Members



— 20+ years of collaboration —

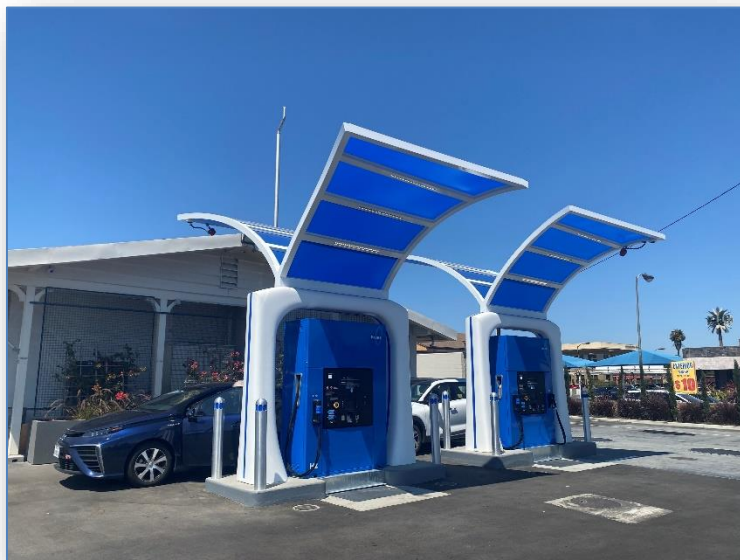


By the Numbers

	Numbers as of July 1, 2021	Total
FCEVs—Fuel cell cars sold and leased in US*		10,803
FCEBs—Fuel cell buses in operation in California		48
Fuel cell buses in development in California		38
Hydrogen stations available in California**		48
Retail hydrogen stations in <i>construction</i> in California***		9
Retail hydrogen stations in <i>permitting</i> in California***		32
Retail hydrogen stations <i>proposed</i> in California***		16
Retail hydrogen stations <i>funded</i> , but not in development in California***		72
Total retail hydrogen stations in development in California***		129
Retail truck hydrogen stations in construction in California		4
Retail truck hydrogen stations <i>funded</i> , but not in development in California****		5



Next-generation stations coming online



Fountain Valley True Zero

Oakland True Zero



San Francisco Shell

- Stations 2-to-8 times larger than the earliest stations
- Station costs coming down
- Station development timelines decreasing

C&S Activities

- ▶ ASTM D03.14 Sub-committee on Hydrogen and Fuel Cells- Chair
- ▶ CGA Hydrogen Technology Committee
- ▶ CSA Group
 - Transportation Strategic Steering Committee
 - Hydrogen Transportation Technical Committee- Chair
 - Fuel Cell Technical Committee
- ▶ Fuel Cells and Hydrogen Energy Association, Transportation Working Group, Hydrogen Codes Task Force- Chair
- ▶ NFPA 2 Hydrogen Technologies Code, Technical Committee
- ▶ ISO/TC 197 U.S. Technical Advisory Group
 - WG 24 Gaseous hydrogen – Fuelling protocols for hydrogen-fuelled vehicles
 - WG 33 Sampling for fuel quality analysis
- ▶ ISO/TC 158 U.S. Technical Advisory Group
- ▶ SAE Fuel Cell Standards Committee
 - Fuel Cell Interface Task Force
 - Fuel Cell Safety Task Force
- ▶ U.S. DOE Codes & Standards Technical Team

What you'll hear about today

- ▶ Current activities
- ▶ Harmonization efforts
- ▶ New & emerging applications



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<https://cafcp.org/>

<https://m.cafcp.org>

<http://h2tools.org>



CHS... Bringing together individuals and organizations to develop and share best safety practices and learnings

Speakers



Nick Hart, Ph.D.
Compliance Officer,
ITM Power, Sheffield, UK

- Leads the compliance activities for ITM's electrolyser and refuelling station products and operations.
- ISO/TC 197
- UK expert to the Comité Européen de Normalisation (CEN) TC 268 WG5, preparing standards harmonized to the European Directive 2014/94/EU on alternative fuels infrastructure.
- Chair of the British Standards Institute (BSI) committee PVE/3/8
- Secretary of the British Compressed Gases Association (BCGA) technical sub-committee (TSC) 9 developing UK national standards relating to alternative fuels.
- Chair of the FCH JU Regulation Codes and Standards (RCS) Strategy Coordination Group (SCG)
- Active member of the SAE FC Interface Task Force
- GTR13 working group
- CEN/CENELEC Sector Forum Energy Management (SFEM) Working Group Hydrogen.



Chris LaFleur, P.E.
Program Lead for Hydrogen
Safety, Codes & Standards
Sandia National Laboratories,
Albuquerque, New Mexico, U.S.

- Responsible for the fire risk program activities and conducting research on the fire risks of emerging energy technologies.
- Previously worked at General Motors and Parsons Engineering Science.
- She has represented the U.S. in the development of hydrogen codes and standards for maritime applications
- A member of the sprinkler discharge criteria committee of NFPA 13, Installation of Sprinkler Systems, and
- NFPA 2, Hydrogen Technologies Code
- Member of AIChE's Center for Hydrogen Safety's Hydrogen Safety Panel.
- Earned a BS in geology and mechanical engineering from the Univ. of Rochester, an MS in fire protection engineering from the Univ. of Maryland, and a doctorate of engineering in manufacturing engineering from the Univ. of Michigan.
- She is a licensed professional engineer.