

A decorative graphic on the left side of the slide, consisting of four overlapping circular frames. The top frame shows solar panels, the middle frame shows a power plant with cooling towers, the bottom-left frame shows a helicopter near a power line tower, and the bottom-right frame shows a worker on a power line tower.

# Technical Norms and Standards for Green Hydrogen Applications: A Users Perspective

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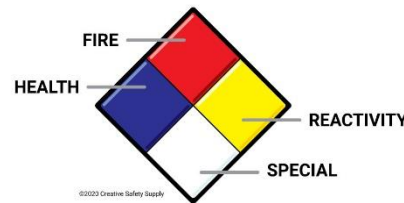
Date: 20 September 2022

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## How do we become comfortable with Hydrogen like we did with Petrol?

**GASOLINE**  
CAS No. 8006-61-9

Clear liquid; distinctive odor.  
Irritating to eyes / skin / respiratory track.  
Also, causes: dizziness, drunkenness, unconsciousness. Absorbed through skin.  
Chronic: dermatitis.  
Possible cancer hazard. Flammable.  
Can form explosive mixtures in the air.



**Hydrogen**

Colorless, odorless, highly flammable gas. Stored as a compressed gas in cylinders. Simple asphyxiant (reduced oxygen available for breathing). Eye and skin contact with the compressed gas may cause frostbite.

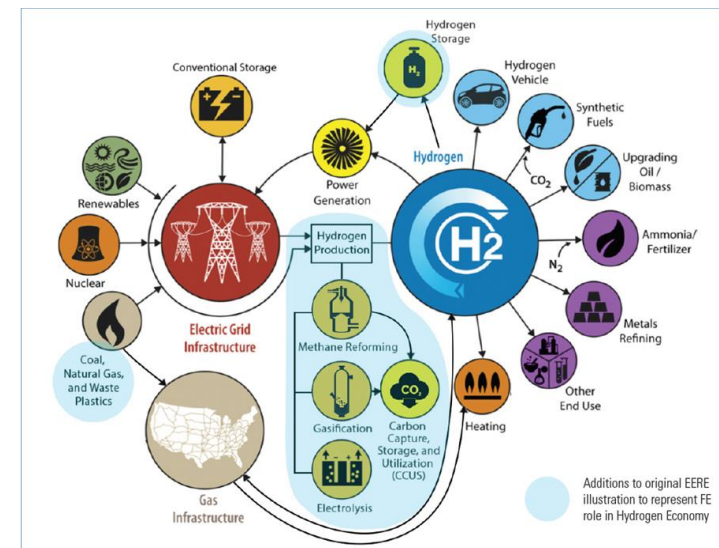
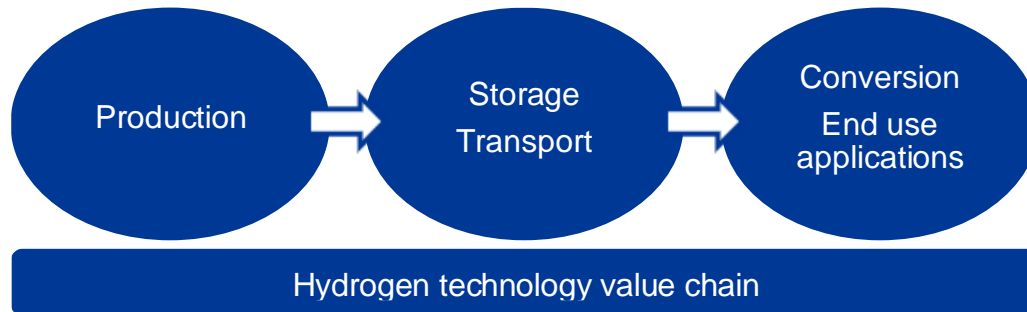
CAS No. 1333-74-0



# Importance of Hydrogen Technology Standards & Codes

## Crosscutting Elements

Safety Codes & Standards  
Manufacturing & Supply Chain  
Education & Workforce  
Technology Perceptions



Source : US DOE, Hydrogen Strategy: Enabling a low-carbon Economy, 2020

- Typical integrated hydrogen system (production to end use) is bound by “cross-cutting” elements. If cross cutting elements are not at optimum levels, the hydrogen value chain collapses.
- Safety codes and standard must be balanced in the system. Need to provide adequate safety for the system and workers/users, while still ensuring hydrogen technology economic competitiveness against alternatives. Without this balance, hydrogen technology systems will struggle.
- During the early stages of hydrogen technology & industry development, there needs to be pragmatic approach to address “gaps” to ensure progress. “Chicken/egg” situations can prevail between suppliers, users and regulators – these need to be addressed efficiently or projects cannot progress and interest can be lost.

## Hydrogen/Fuel Cell Codes & Standards



So. America / Africa / Australia

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[Portable & Micro F/C](#)

[H2 Infrastructure](#)

[Misc](#)

[North America](#)

[International](#)

[Europe](#)

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**This website tracks the world-wide development of about 400 hydrogen and fuel cell standards, and its matrix can be searched, using the TABS above, by the following applications or geographic areas:**

[Stationary Fuel Cells](#)

[Hydrogen & Fuel Cell Vehicles](#)

[Portable & Micro Fuel Cells](#)

[H2 Infrastructure](#)

[Misc.](#) (Forklift Trucks, Aviation, Marine & Bicycle Applications, Other Fuels and Definitions)

[International](#)

[North America](#)

[Europe](#)

[Pacific Rim](#)

[South America /Africa / Australia](#)

**Detailed information for each standard is provided.**

For questions, please contact the Safety Report Technical Editors: Karen (Hall) Quackenbush ([kquackenbush@fchea.org](mailto:kquackenbush@fchea.org)) or Connor Dolan ([cdolan@fchea.org](mailto:cdolan@fchea.org)). This website [www.fuelcellstandards.com](http://www.fuelcellstandards.com) is managed by the Fuel Cell and Hydrogen Energy Association (FCHEA).

FCHEA represents the leading companies and organizations that are advancing innovative, clean, safe, and reliable energy technologies.

FCHEA drives support and provides a consistent industry voice to regulators and policymakers. Our educational efforts promote the environmental and economic benefits of fuel cell and hydrogen energy technologies.

For more information on FCHEA, visit us online at [www.fchea.org](http://www.fchea.org). For additional Hydrogen and Fuel Cell related safety information, please check out [www.hydrogenandfuelcellsafety.info](http://www.hydrogenandfuelcellsafety.info).

Source :[http://www.fuelcellstandards.com/soamerica\\_loc.html](http://www.fuelcellstandards.com/soamerica_loc.html)

- Issue of too many standards/codes as harmful as too few.
- Alignment and acceptance across regions critical or could increase cost of business.
- Local SA harmonization and need for filtering of standards so developers are not confused between too many/too few standards/codes, and which ones to use where.

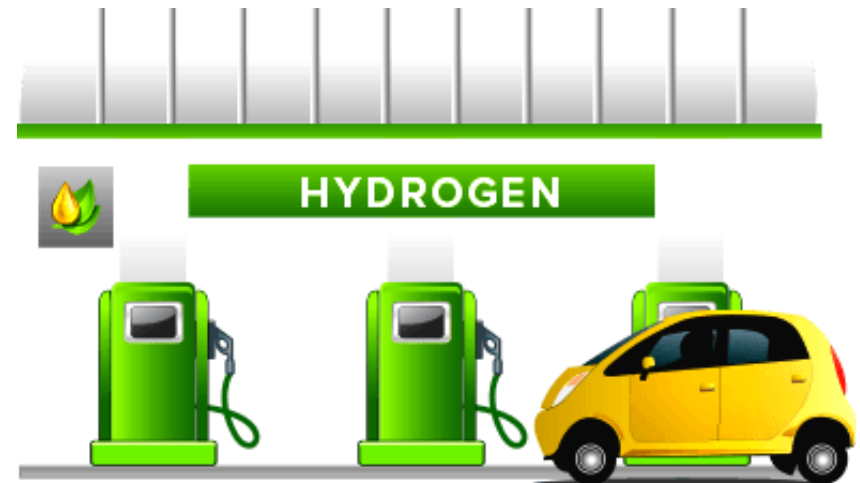
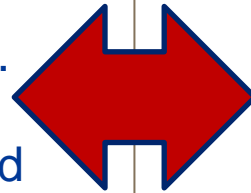
- Eskom produces grey hydrogen onsite via electrolysis at Power Stations for Generator Cooling
  - Alkaline electrolyzers installed at 12 Power Stations
  - Capacity range form 10 -25 Nm<sup>3</sup>/h per Power Station
- Standard: Hydrogen System Standard 240-56227413
  - NASA Standard NSS 1740.16, Safety Standard for Hydrogen and Hydrogen Systems
  - NFPA 50A, Standard for Gaseous Hydrogen Systems at Consumer Sites.
  - ANSI/AIAA G-095-2004, American Institute of Aeronautics and Astronauts, Guide to Safety of Hydrogen and Hydrogen Systems, American National Standard Institute, Reston, VA, USA, 2005
  - Compressed Gas Assosiation G-5, Hydrogen.





# Finding the Balance Between Standards for Safety vs Economics

- ✓ To develop and implement practices and procedures that will ensure safety during the operation, use and handling of Hydrogen while ensuring economic viability
- ✓ To ensure alignment of Standards between regions, countries and suppliers for ease of integration.
- ✓ To create regulatory support and ensure the regulatory processes are achievable
- ✓ To achieve realisable certification processes that meets most needs.
- ✓ To educate End-Users
- ✓ To provide confidence to developers and investors.





- Important to recognise the multifaceted role and significance of fit for purpose hydrogen codes and standards.
- Getting to the optimum, fit for purpose codes and standards requires various stakeholders across the hydrogen value chain to work together for green hydrogen technology to rise to meet its projected potential.
- Early stages of hydrogen technology and industry development will require, mature, pragmatic approaches where there are gaps in codes and standards to satisfy various needs, while promoting the industry growth.
- **Recommendation:** Create a National SA Demo Project (across as many legs of the hydrogen value chain as possible) to the recommended codes and standards, regulatory/certification process. **Objective:** Firstly to identify the specific difficulties (at detail level) & secondly to resolve upfront. This will pave the way for other, larger projects and provide confidence to developers and investors to proceed. *“It always seems impossible, until it is done” Nelson Mandela*