

Meetings of IECEx System *The 25th Meeting of the ExMC*

Edinburgh, September 21-22, 2023

ISO Standards on Hydrogen

Safety & Sustainability

Dr. Andrei V. Tchouvelev, Chair, ISO/TC 197/SC 1

**ISO/TC 197 Plenary Week
Sydney, Australia, December 5-9, 2022**



26TH ISO/TC 197 PLENARY MEETING 第26次国际标准化组织氢能技术标委会全体会议



ISO/TC 197 Hydrogen Technologies

SC 1 Hydrogen at Scale and Horizontal Energy Systems

Scope of ISO/TC 197:

Standardization in the field of systems and devices for the production, storage, transport, measurement and use of hydrogen

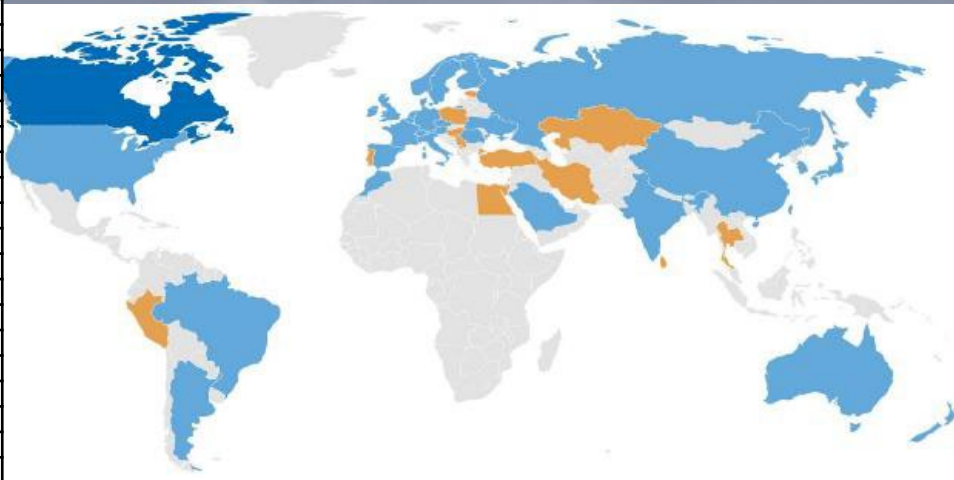
Scope of ISO/TC 197/SC 1:

Standardization of large-scale hydrogen energy systems and applications including aspects of testing, certification, sustainability and placement, and coordination with other relevant standardization bodies and stakeholders

ISO/TC 197 Membership



PARTICIPATING MEMBERS (34)	
COUNTRY/TERRITORY	ACRONYM
Argentina	IRAM
Australia	SA
Austria	ASI
Belgium	NBN
Brazil	ABNT
Canada	SCC
Chile	INN
China	SAC
Czech Republic	UNMZ
Denmark	DS
Finland	SFS
France	AFNOR
Germany	DIN
Hungary	MSZT
India	BIS
Ireland	NSAI
Italy	UNI
Japan	JISC
Korea, Republic of	KATS
Morocco	IMANOR
Netherlands	NEN
New Zealand	NZSO
Norway	SN
Romania	ASRO
Russian Federation	GOST R
Saudi Arabia	SASO
South Africa	SABS
Spain	UNE
Sweden	SIS
Switzerland	SNV
Ukraine	DSTU
United Arab Emirates	MolAT-STR
United Kingdom	BSI
United States	ANSI



- ❑ Established in 1990
- ❑ 31 Plenary meetings
- ❑ Next meeting – Vienna, Nov. 2023

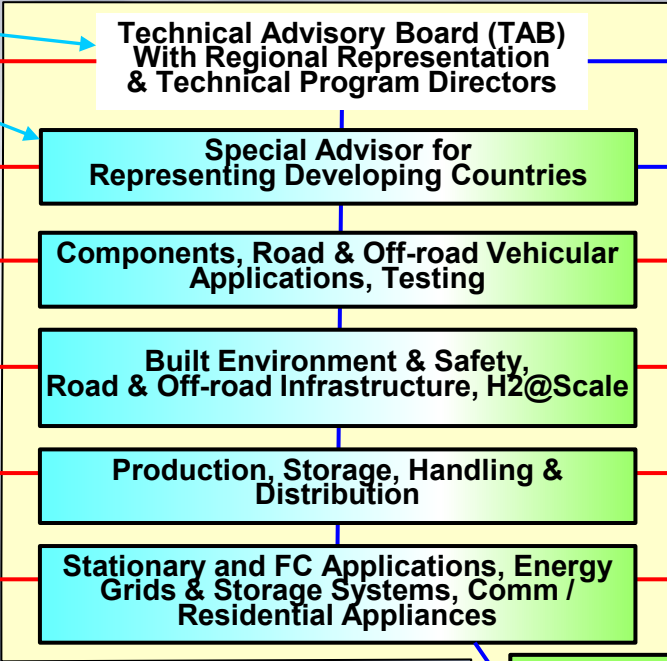
OBSERVING MEMBERS (14)	
COUNTRY/TERRITORY	ACRONYM
Bulgaria	BDS
Egypt	EOS
Estonia	EVS
Hong Kong Special Administrative Region of China	ITCHKSAR
Iran, Islamic Republic of	INSO
Israel	SII
Kazakhstan	KAZMEMST
Peru	INACAL
Poland	PKN
Portugal	IPQ
Serbia	ISS
Sri Lanka	SLSI
Thailand	TISI
Turkiye	TSE

ISO/TC197 High Level Organization Chart



Shared TAB co-chaired by TC197 and SC 1 Chairs, and Special Advisor

TC197 Hydrogen Technologies Secretariat and Chair



SC1 H2@Scale & Horizontal Energy Systems Secretariat & Chair

WG 1, 5, 18, 19, 20, 22, 23, 30, 31, 33, 36

WG 24, 29, 35

WG 15, 17, 21, 25, 26, 34

WG 27, 28

WG Off-road, Testing

WG Off-road, H2@Scale

WG Pipelines, Multifuel

WG Energy Storage...

Sustainability of H2 Technologies (GHG, H2GO, Certification)

WG 1

AHG Rail

WG 2

— Administrative reporting for relevant deliverables
 — Technical input, coordination and collaboration

ISO/TC 197 Working Groups



WG	Title	ISO
WG1	Liquid hydrogen - Land vehicles fuel tanks	13985 revision
WG35	Liquid hydrogen - Land vehicle fueling protocol	13984 revision
WG27	Hydrogen fuel quality	14687 revision
WG29	Basic considerations for the safety of hydrogen systems	TR15916 revision
WG5	Gaseous hydrogen land vehicle refuelling connection devices (up to and above 120 g/s flow)	17268-1, -2 rev.
WG36	Gaseous hydrogen land vehicle refuelling connection devices – Cryo-compressed H2 gas	17268-3
WG19	Gaseous hydrogen fueling station – Dispensers	19880-2
WG21	Gaseous hydrogen fueling station – Compressors	19880-4
WG22	Gaseous hydrogen fueling station – Hoses	19880-5
WG23	Gaseous hydrogen fueling station – Fittings	19880-6
WG31	Gaseous hydrogen fueling station – O-rings	19880-7
WG28	Gaseous hydrogen fueling station – Hydrogen quality control	19880-8
WG33	Gaseous hydrogen fueling station – Sampling for fuel quality analysis	19880-9
WG18	Gaseous hydrogen land vehicle fuel tanks and TPRDs	19881, 19882 rev.
WG15	Cylinders and tubes for stationary storage	19884
WG24	Gaseous hydrogen – Fuelling protocols for hydrogen-fuelled vehicles	19885-1, -2, -3
JWG30	Gaseous hydrogen land vehicle fuel system components	19887
WG34	Hydrogen generators using water electrolysis – Industrial, commercial, and residential applications	22734-1 revision
WG32	Hydrogen generators using water electrolysis – Test protocols for performing electricity grid services → To be moved to SC 1 as WG 2 (expect NWIP from Germany for TS)	TR22734-2 5 TR → TS

ISO/TC 197 & SC1 Division of Scope



ISO/TC 197 Focus

- ✓ Basic Requirements for Hydrogen Technologies
 - Production
 - Storage
 - Handling
 - Built environment
 - Protocols and components including road vehicles and their fueling infrastructure



(Toyota website)



ISO/TC 197 / SC1 Focus

- ✓ Applications' requirements of Hydrogen technologies at large scale and in horizontal energy systems with H2 as a central link
- ✓ Coordination with TCs & stakeholders on:
 - Renewables and Energy Storage/Grid Balancing
 - Multi-fuel systems
 - Sustainability aspects (GHG, H2GO, Cert)
 - Testing and certification of H2 components
 - Rail, maritime, aviation applications
 - Residential applications



(Toyota website)

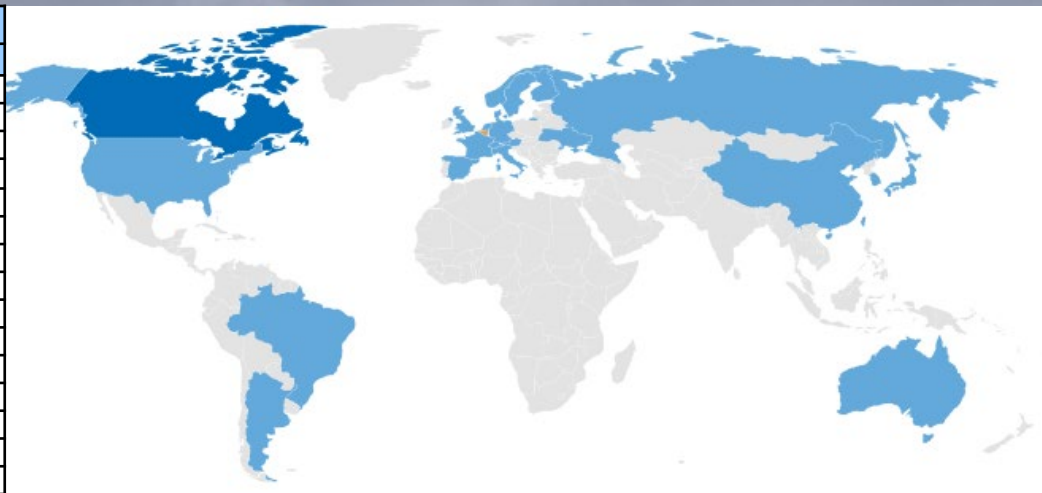


(Toshiba website)

ISO/TC 197 / SC1 Membership



PARTICIPATING MEMBERS (25)	
COUNTRY/TERRITORY	ACRONYM
Argentina	IRAM
Australia	SA
Austria	ASI
Belgium	NBN
Brazil	ABNT
Canada	SCC
Chile	INN
China	SAC
Denmark	DS
Finland	SFS
France	AFNOR
Germany	DIN
Italy	UNI
Japan	JISC
Korea, Republic of	KATS
Namibia	NSI
Netherlands	NEN
Norway	SN
Russian Federation	GOST R
South Africa	SABS
Spain	UNE
Sweden	SIS
Switzerland	SNV
United Kingdom	BSI
United States	ANSI



- Established in 2022
- 1 Plenary meeting
- Next meeting – Vienna, Nov. 2023

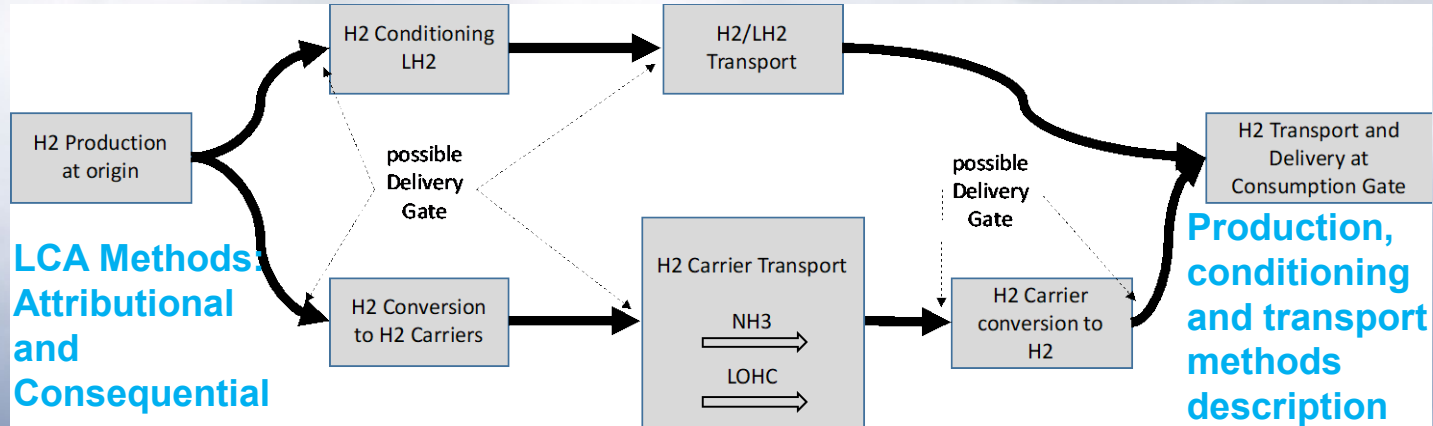
OBSERVING MEMBERS (3)	
COUNTRY/TERRITORY	ACRONYM
Egypt	EOS
Poland	PKN
Ukraine	SE UkrNDNC

Scope of ISO Methodology



In order to develop an international hydrogen market, it is paramount first to agree on a **uniform Methodology** for determining the greenhouse gas (GHG) emissions associated with the **Production, Conditioning and Transport of Hydrogen to Consumption Gate**.

Considered hydrogen supply chain



LCA Methods:
Attributional
and
Consequential

Production,
conditioning
and transport
methods
description

FINAL DRAFT TECHNICAL SPECIFICATION ISO/DTS 19870

ISO/TC 197/SC 1
Secretariat: SCG
Voting begins on:
2023-08-31
Voting terminates on:
2023-10-26

Methodology for Determining the Greenhouse Gas Emissions Associated with the Production, Conditioning and Transport of Hydrogen to Consumption Gate

COPIES OF THIS DRAFT ARE SENT TO MEMBERS WITH THEIR USUAL NOTIFICATION OF ANY REVISIONS. ANY AMENDMENTS TO THIS DOCUMENT MUST BE APPROVED BY THE SECRETARIAT.

IN ADDITION TO THESE CONDITIONS, AS BEING ACCEPTED FOR PUBLICATION, TECHNICAL, COMMERCIAL, AND OTHER RELEVANT ASPECTS OF THIS DOCUMENT MUST BE CONSIDERED IN THE LIGHT OF THEIR APPLICABILITY TO BEING APPLIED TO OTHER REGULATIONS MAY BE MADE IN NATIONAL REGULATIONS.



Reference number ISO/DTS 19870:2023(E)

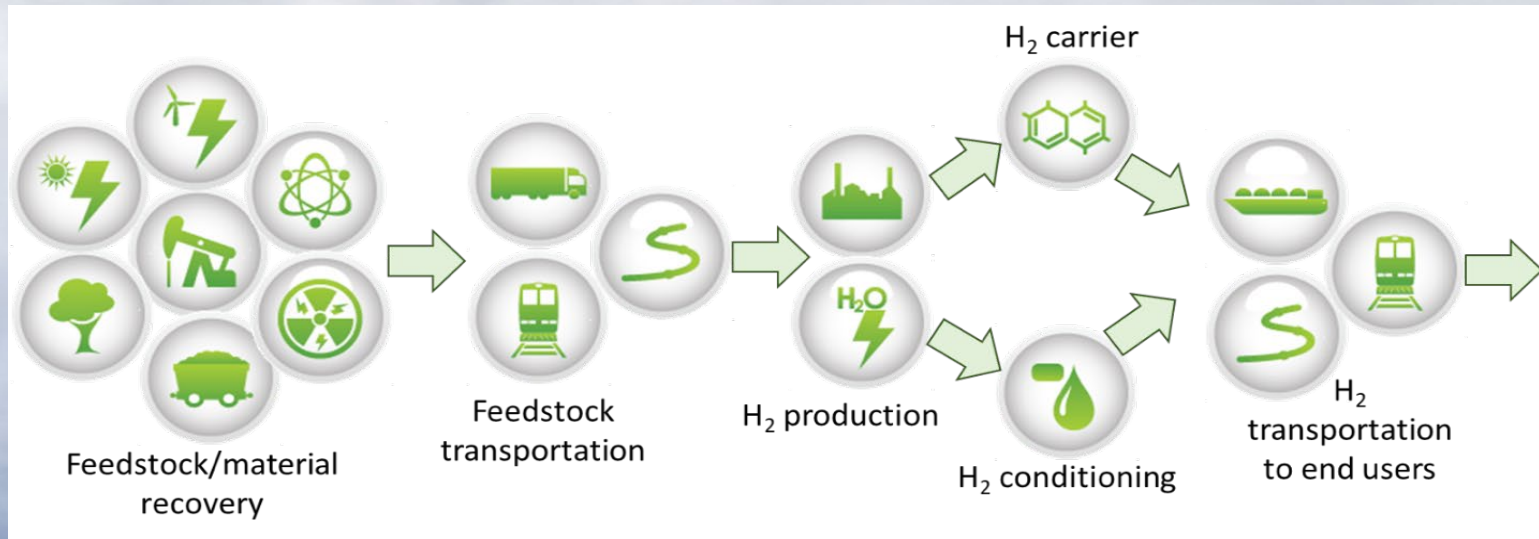
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ISO/TS 19870 Pub. Dec 2023
ISO 19870-1, -2, -3: 2024-26

Methodology System Boundary



ISO/TS 19870 also considers indirect emissions including those associated with the upstream activities in the raw material acquisition phase, raw material transport phase, etc. GHG emissions contributions are defined in terms of carbon dioxide equivalent (CO₂e).



Schematic of “well-to-consumption gate” system boundary adopted for ISO/TS 19870

Hydrogen Product Climate Impact Triangle

Decarbonization Attribute Beyond Colours

Classification

Generic Grade or Label to reflect GHG footprint value and / or range.
For stakeholder information only.

Driven by Public Policies

Certification

Quantified GHG footprint per Methodology of H2 or carrier product issued by a Certification Body and verified by a Verification Body.
Contains GO. Part of legal conditions of a supply contract.
Compliance or disclosure scheme. Subject to mutual recognition.

Driven by Science & Technology

Methodology for GHG Footprint Quantification (ISO/TS 19870)



IECEX-ISO Collaboration on Certification of H₂ Equipment

Traditional Areas – Areas where Flammable and Combustible materials may be present

IECEX provides a single global solution for assessment + Certification of Equipment/Services/Persons



- ❑ Key Role in the new Emerging Hydrogen and Fuel Cell Economy
- ❑ According to World Energy Council by 2025, hydrogen strategies can be expected to cover countries representing over 80% of global GDP
- ❑ Logical extension to IECEX past coverage of Ex Equipment in Hydrogen areas
- ❑ IECEX Expert WG 19 “Hydrogen Technologies” current focus:
 - Personnel Certification of Competence according to ISO TC 197 and IEC TC 105 Standards (eg ISO 15916 *Basic considerations for the safety of hydrogen systems*)
 - Certification of Equipment associated with Hydrogen dispensing systems
 - Certification of Stationary and Portable Fuel Cells (IEC 62282 series).