Hydrogen & Fuel Cell Seminar 2023

ISO/TC197 Hydrogen Technologies Update

February 8 , 2023

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The Association of Hydrogen Supply and Utilization Technology (HySUT)

Chair, ISO TC/197 Hydrogen Technologies

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Contents

1. Introduction About HySUT

HySUT
The Research Association of Hydrogen Supply/Utilization Technology

Established **July 31, 2009**
End of activity March 31, 2016

HySUT
The Association of Hydrogen Supply and Utilization Technology

Established Feb 2, 2016
Start of activity **April 1, 2016**

Chairman: Tomohide Miyata, Director, Senior Vice President, ENEOS Corporation
Location: 5-10 Akasaka Minato-ku, Tokyo 107-0052
Members: 45 companies and organizations (as of February 2023)

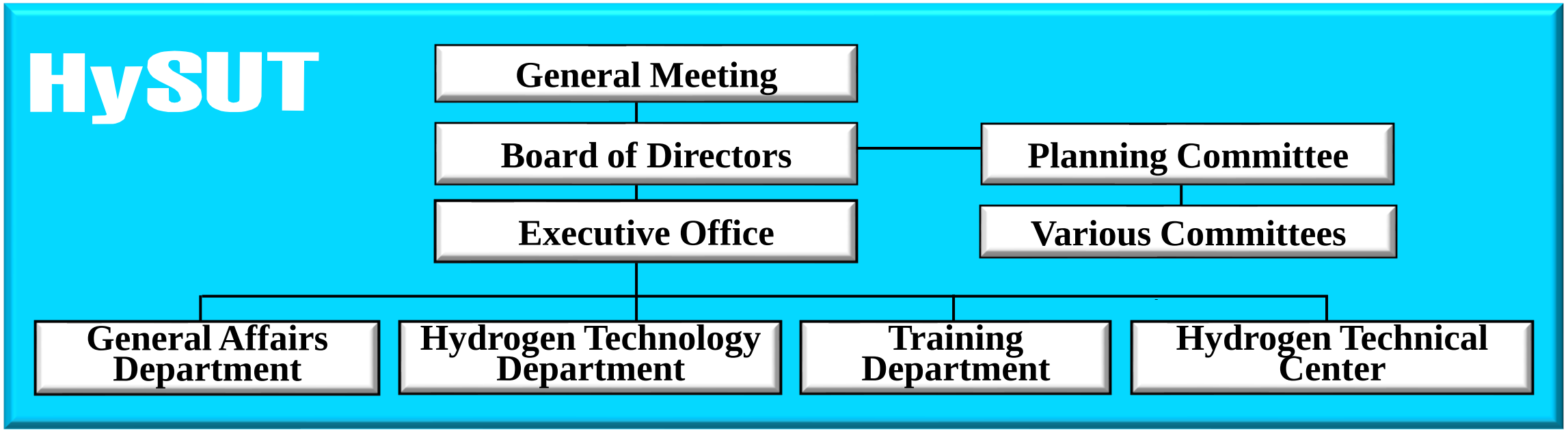
Missions: We aim to ensure the stable supply and safe distribution of hydrogen, improve user satisfaction, and contribute to the development of the hydrogen energy industry by taking a comprehensive approach and engaging in such activities as technological development, surveys and research, education and outreach on the supply and the utilization of hydrogen energy.

Industry organization specializing in hydrogen fueling infrastructure for mobility such as fuel cell vehicles

Activity Fields and Organization Chart of HySUT

1. **Technology Research and Development /** R&D for HRS (Hydrogen Refueling Stations) (NEDO's Program)
2. **International Standard Harmonization /** **Country member body of ISO/TC197 (NEDO's Program)**
3. **Support and Reliability Improvement of HRS /**
   Technical Support for Retail HRS, Safety and Security Activities, Education and training
4. **Industrial Activities /** Guidelines for HRS Technologies, Regulations Review
5. **Public Relations /** Outreach activities including exhibitions and trade shows

NEDO: The New Energy and Industrial Technology Development Organization



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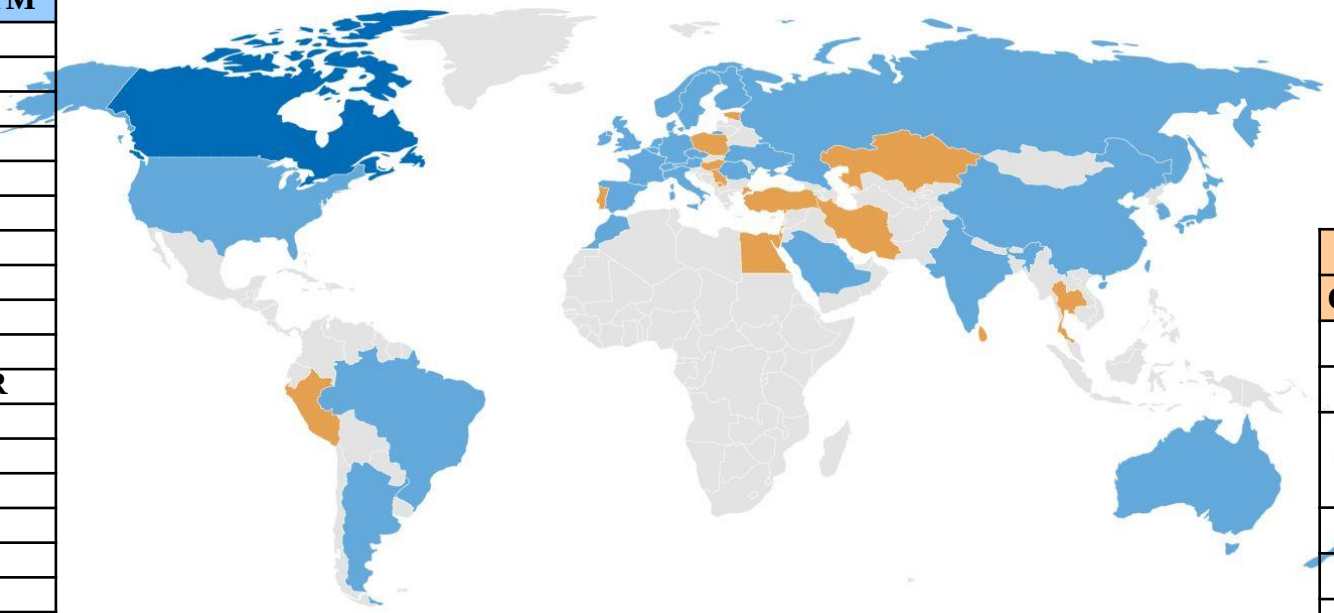
2. ISO/TC 197 Hydrogen Technologies

Scope:

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

ISO/TC 197 Hydrogen Technologies

PARTICIPATING MEMBERS (30)	
COUNTRY/TERRITORY	ACRONYM
Argentina	IRAM
Australia	SA
Austria	ASI
Belgium	NBN
Brazil	ABNT
Canada	SCC
China	SAC
Czech Republic	UNMZ
Denmark	DS
Finland	SFS
France	AFNOR
Germany	DIN
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
Spain	UNE
Sweden	SIS
Switzerland	SNV
Ukraine	DSTU
United Kingdom	BSI
United States	ANSI



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

OBSERVING MEMBERS (14)	
COUNTRY/TERRITORY	ACRONYM
Egypt	EOS
Estonia	EVS
Hong Kong Special Administrative Region of China	ITCHKSAR
Hungary	MSZT
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/TC 197 Plenary Meeting
Virtual, December 9, 2020

Duration 3.5 hrs (Including 1 break)		
Time Zones	**Start**	**End**
PST	5:30 AM	9:00 AM
EST	8:30 AM	12:00 PM
London	1:30 PM	5:00 PM
CEST	2:30 PM	6:00 PM
Moscow	4:30 PM	8:00 PM
Delhi	6:00 PM	9:30 PM
Beijing	8:30 PM	12:00 AM
Seoul	9:30 PM	1:00 AM
Tokyo	9:30 PM	1:00 AM
Canberra	10:30 PM	2:00 AM

ISO/TC 197 Plenary Week
Seoul, Korea, Planned as Hybrid changed to Virtual
December 6 - 10, 2021

Program:

- ✓**Strategic planning meeting (2 days)**
- ✓**Plenary meeting (3 days)**

Duration per day: 3.5 hours

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

Program:

- ✓ **Working group meetings**
- ✓ **Strategic planning meeting**
- ✓ **Plenary meetings (TC197 & SC1)**

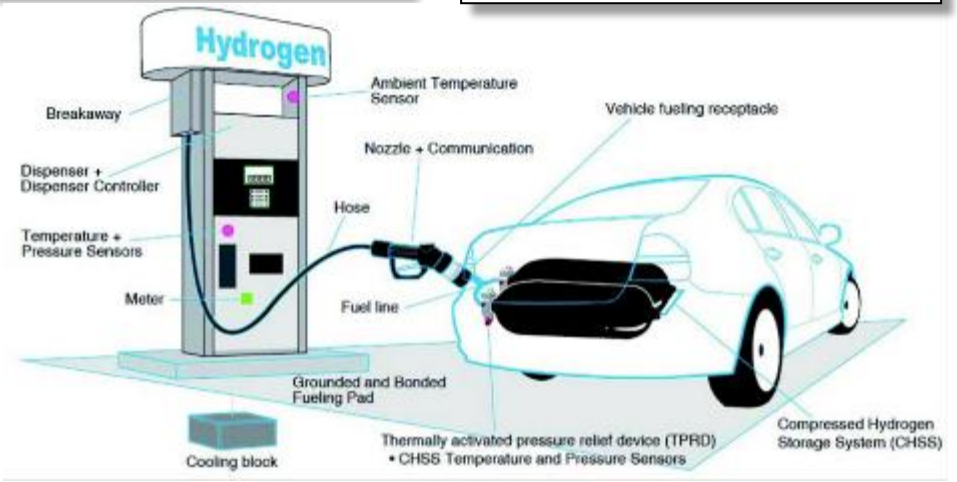
ISO/TC 197 Work Program by 2020

Fuel Quality

ISO 14687 Rev
→ Pub. 2019, cont.

Electrolysers

ISO 22734 Rev
→ Pub. 2019



Vehicle Components

Fueling Connectors
ISO 17268 Rev → Pub. In 2020, cont. work on H70HF (HD)

On-board Storage
ISO 19881 → Pub. in 2018, cont. to align with GTR13 Ph2

TPRD
ISO 19882 → Pub. in 2018, cont. to align with GTR13 Ph2

Storage Technologies

GH_2 Ground Storage ISO 19884 → FDIS failed; restart in 2020 w/NWIP (WG 15 on-going)
Me-Hy Portable Storage
ISO 16111 Rev → Published in 2018

Fueling Family ISO 19880

-1: HFS General Requirements → Pub. in 2020
-2: Dispensers → DIS Restart → FDIS by end 2023
-3: Valves → Pub. in 2018
-4: Compressors → CD
-5: Hoses → Pub. in 2019, cont.
-6: Fittings → CD → DIS by early 2023
~~-7: Fueling Protocols~~ (New Project #)
-8: Fuel Quality Control → Pub. in 2019, cont.

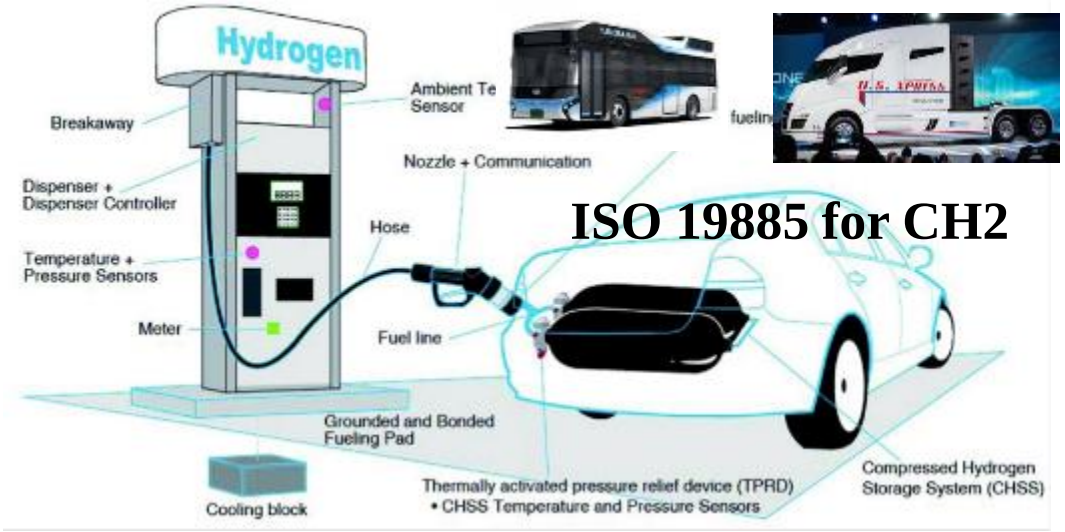
ISO/TC 197 Approved New Projects (2020 - 22)

Electrolysis ISO 22734:

Dynamic performance / safety -1
Testing for grid service -2

Fueling Family ISO 19880:

Sampling -9
O-Rings -7



Fueling Protocols for Compressed Hydrogen ISO 19885:

-1: General Req'ts
-2: Comm Req'ts
-3: HF for HD Road Vehicles

Safety:

ISO/TR 15916 Rev → Corr. Materials Compatibility Table
New LH2 chapter

Fuel System Components for Compressed H_2 Vehicles:

ISO 19887 JWG w/TC22/SC41

ISO/TC 197 Working Groups

WG	Title	ISO
WG5	Gaseous hydrogen land vehicle refuelling connection devices	17268
WG15	Cylinders and tubes for stationary storage	19884
WG18	Gaseous hydrogen land vehicle fuel tanks and TPRDs	19881, 19882
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
WG24	Gaseous hydrogen – Fuelling protocols for hydrogen-fuelled vehicles	19885
WG27	Hydrogen fuel quality	14687
WG28	Hydrogen quality control	19880-8
WG29	Basic considerations for the safety of hydrogen systems	TR15916
JWG30	Gaseous hydrogen land vehicle fuel system components	19887
WG31	O-rings	19880-7
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 **TR → TS**
WG33	Sampling for fuel quality analysis	19880-9
WG34	Hydrogen generators using water electrolysis – Industrial, commercial, and residential applications	22734-1

ISO/TC 197 Approved New Projects (2023 -)

- LH2/sLH2 fueling protocol: Rev. ISO 13984
- LH2/sLH2 onboard tank: Rev. ISO 13985
- CcH2 connector: ISO 17268-3

- Methodology for determining the greenhouse gas emissions associated with the production and transport of hydrogen

  ➡ SC1 TS19870

ISO/TC 197 Hydrogen Technologies

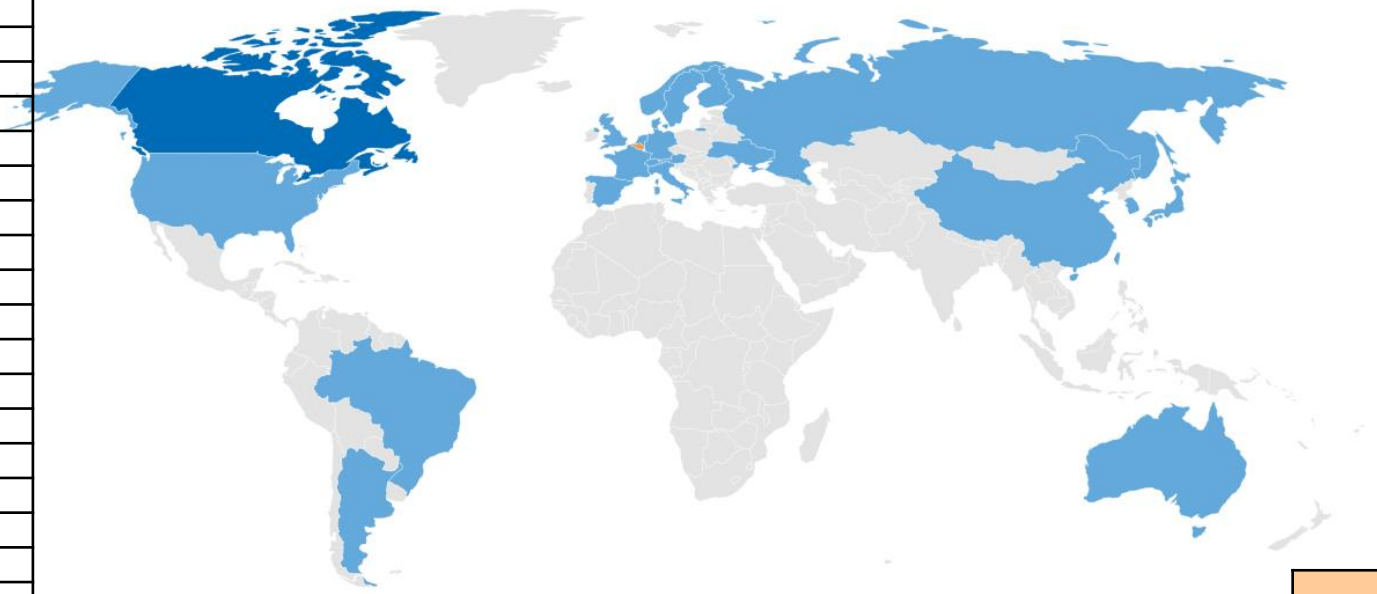
SC 1 Hydrogen at Scale and Horizontal Energy Systems

Scope:

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 /SC 1

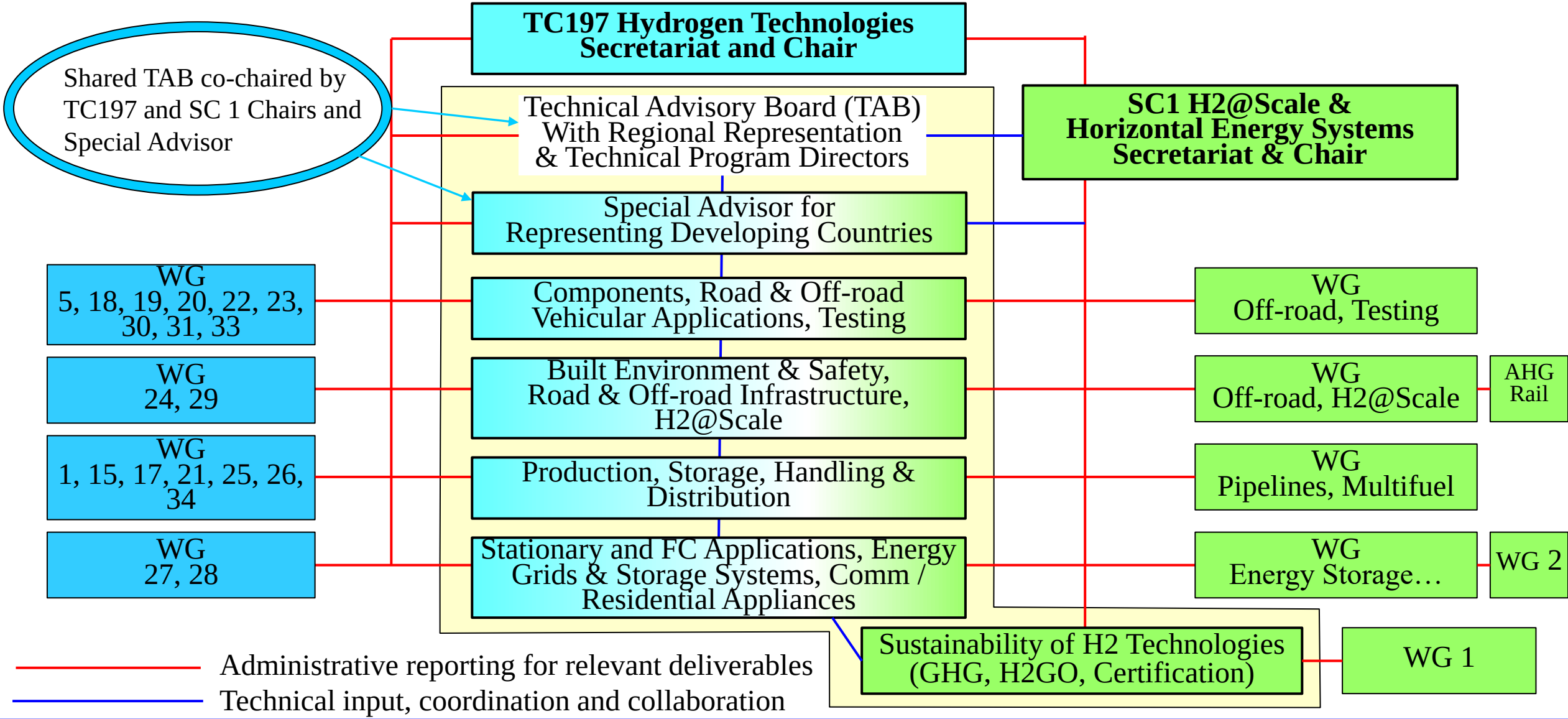
PARTICIPATING MEMBERS (22)	
COUNTRY/TERRITORY	ACRONYM
Argentina	IRAM
Australia	SA
Austria	ASI
Belgium	NBN
Brazil	ABNT
Canada	SCC
China	SAC
Denmark	DS
Finland	SFS
France	AFNOR
Germany	DIN
Italy	UNI
Japan	JISC
Korea, Republic of	KATS
Netherlands	NEN
Norway	SN
Russian Federation	GOST R
Saudi Arabia	SASO
Spain	UNE
Sweden	SIS
Switzerland	SNV
Ukraine	DSTU
United Kingdom	BSI
United States	ANSI



OBSERVING MEMBERS (1)	
COUNTRY/TERRITORY	ACRONYM
Belgium	NBN

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

ISO/TC197 High Level Organization Chart



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)

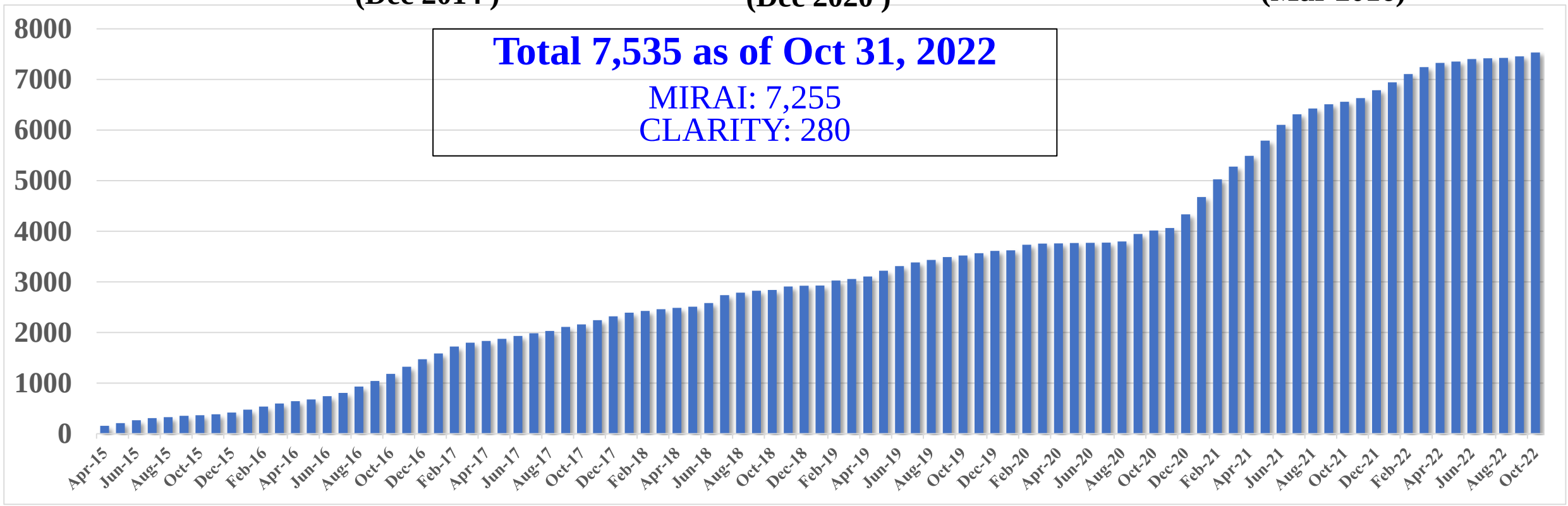
Contents

3. Topics in Japan
Number of registered FCVs in Japan

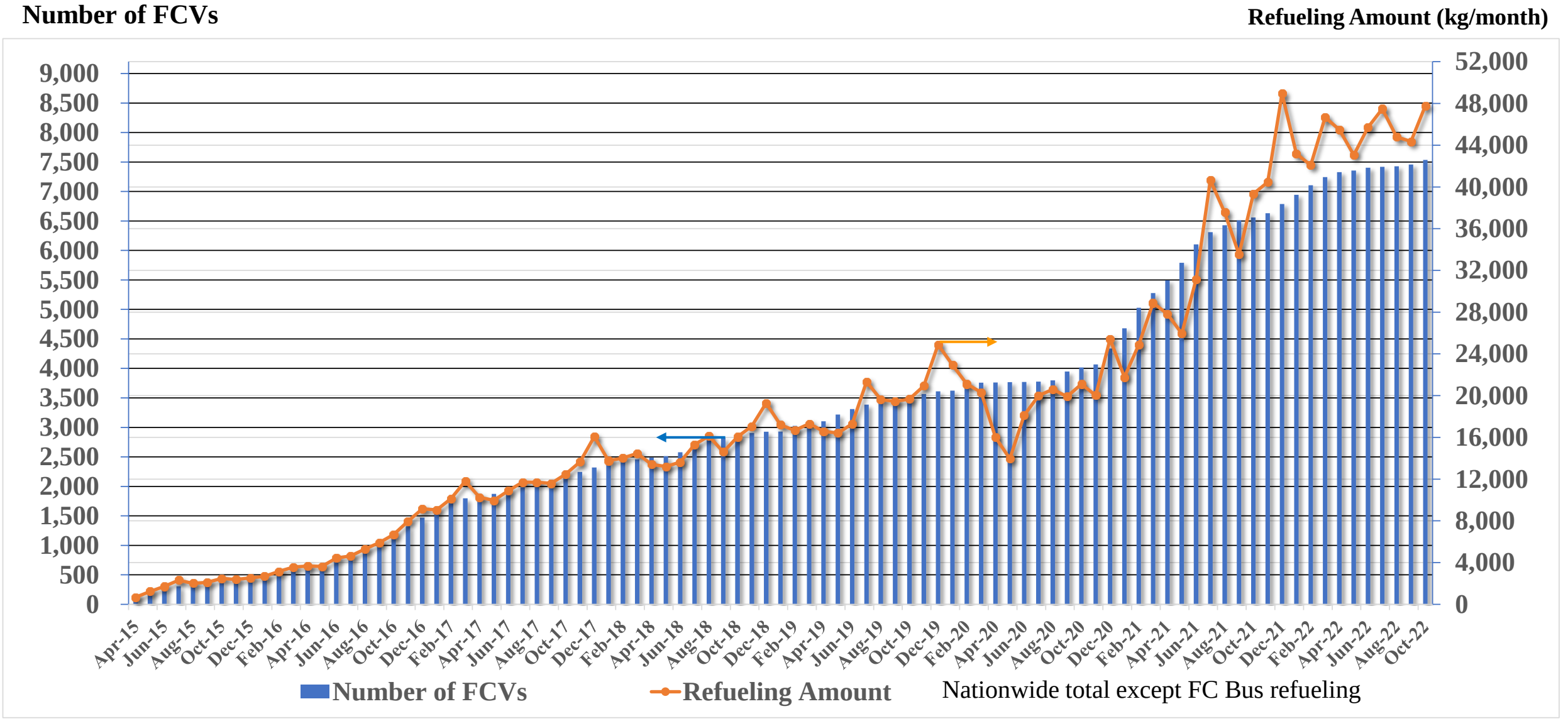
TOYOTA MIRAI
(Dec 2014)

New TOYOTA MIRAI
(Dec 2020)

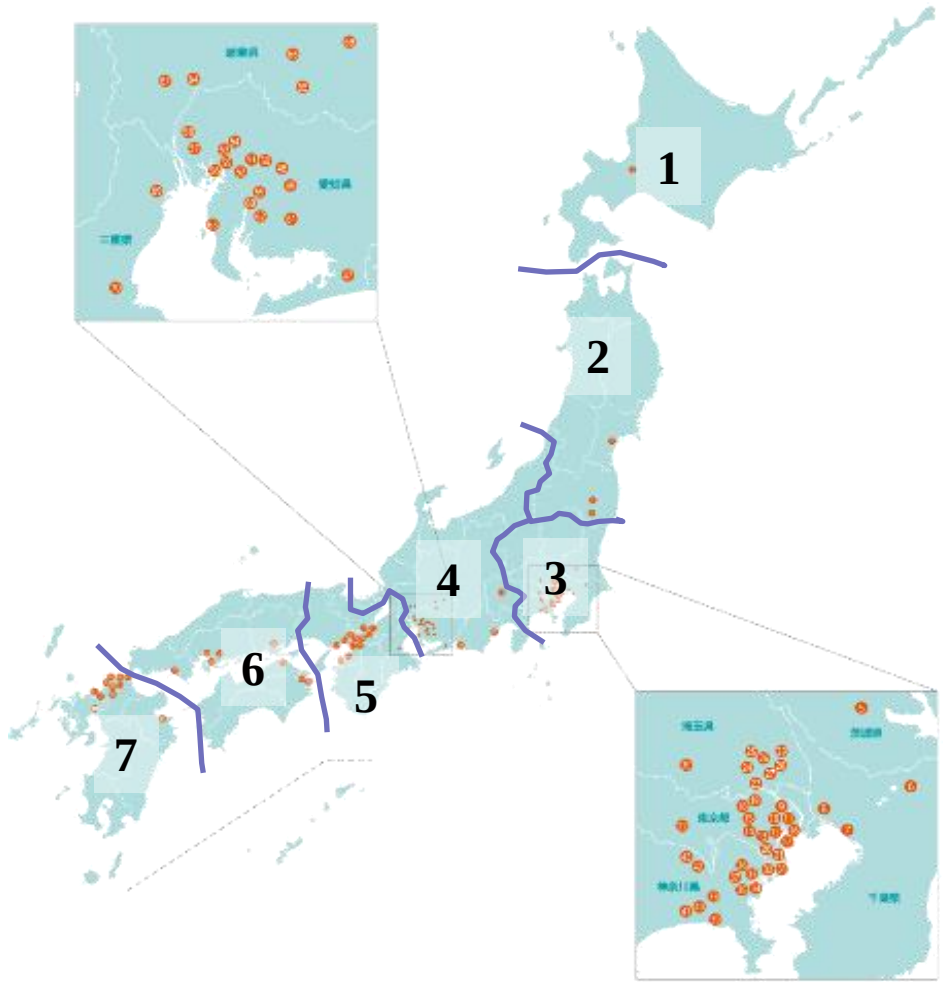
HONDA CLARITY FUEL CELL
(Mar 2016)



Refueling Data at Retail HRS

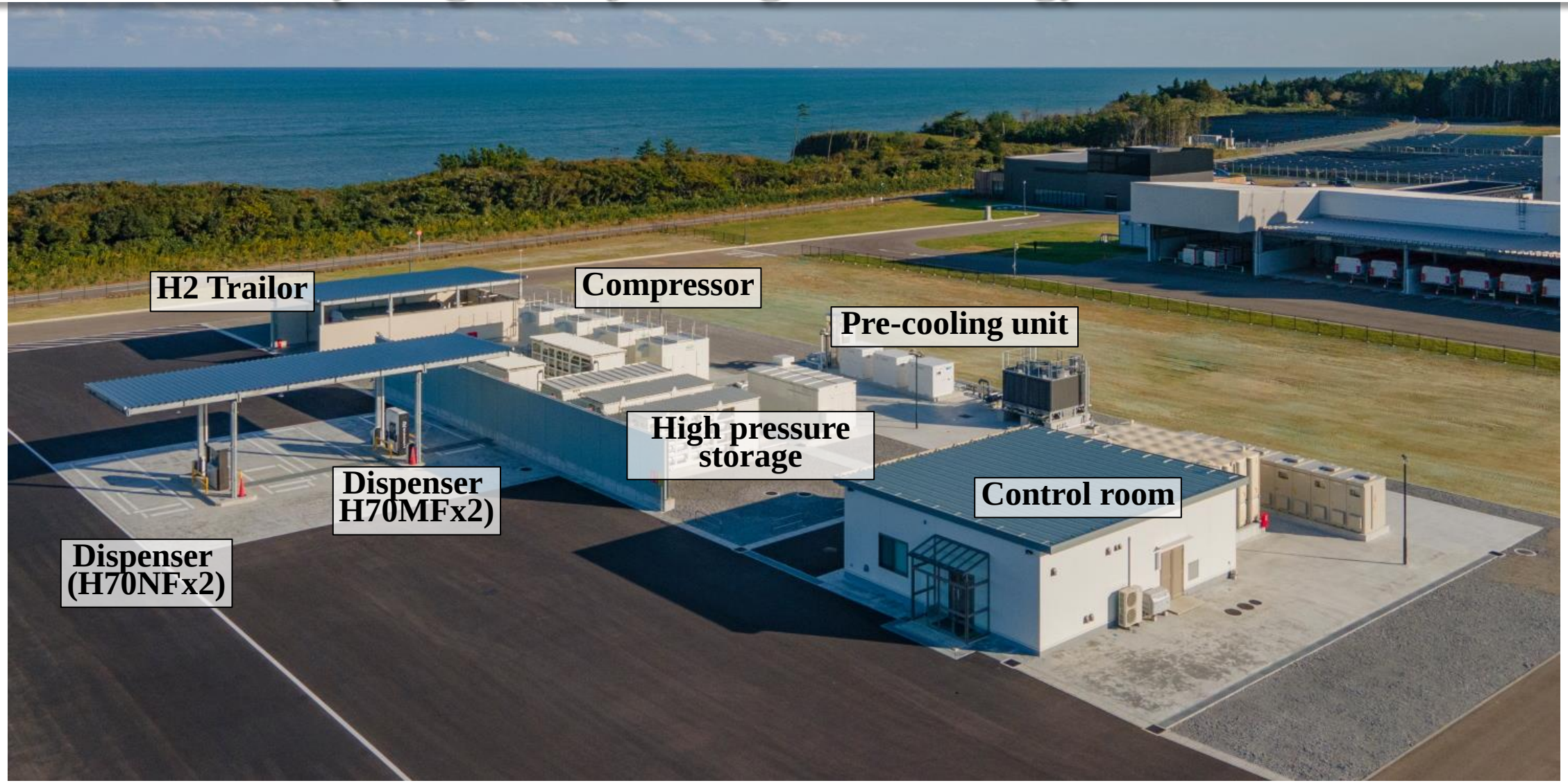


Number of Retail HRS and FCVs (as of Oct 31, 2022)



Area	Number of Retail HRS	Number of FCVs	FCVs / HRS
1. Hokkaido	3	32	11
2. Tohoku	6	259	43
3. Kanto	59	3,573	61
4. Chubu	53	2,291	43
5. Kansai	19	784	41
6. Chugoku/ Shikoku	8	220	28
7. Kyushu	15	376	25
Total	163	7,535	46

New R&D Facility for HDV
"Fukushima Hydrogen Refueling Technology Research Center"



Thank you very much for your attention!

This report contains the results of the programs supported by the New Energy and Industrial Technology Development Organization (NEDO).