WE WILL START AT 10:00 AM (CET)

SESEC VI Webinar 04:
China Hydrogen Energy Standardization

Seconded European Standardization Expert in China (SESEC) Project

You are ***muted***

Use the ***Q&A or Chat Panel*** to submit your questions

Keep your questions ***short and concise***

Contact us: assistant@sesec.eu

Welcome to our website: https://sesec.eu/

SESEC INTRODUCTION

Partners and Role

SESEC is a visibility project co-financed by five European partners

SESEC Partners

- **European Commission (EC)**-The executive body of the European Union; Responsible for proposing legislation, implementing decisions, upholding the treaties and day-to-day management of the EU; DG Grow is the main partner (80%)
- **European Free Trade Association (EFTA)-**Iceland, Liechtenstein, Norway and Switzerland; Intergovernmental organization set up for the promotion of free trade and economic integration to the benefit of its four Member States; None EU members;
- **CEN**-European Committee for Standardization
- **CENELEC**-European Committee for Electrotechnical Standardization
- **ETSI**-European Telecommunications Standards Institute

SESEC INTRODUCTION

A Project co-funded by EC, EFTA, CEN CENELEC & ETSI

- **Promote** European and International standards in China
- **Improve** contacts between Project Partners and different levels of the Chinese administration, industry and standardization bodies
- **Enhance** visibility and understanding of the European Standardization System (ESS) in China.
- **Gather** regulatory and standardization intelligence
- **Undertake** technical lobbying

Goals

- The SESEC initiative supports **EC policy** and **ESOs strategic objectives** in China.
- Our ultimate goal is the enhancement of **EU-China dialogue and cooperation** in the field of standardization.
- It is notably expected to support the Framework Cooperation Agreement in place **between the ESOs and SAC.**

Project's Priorities

Priorities of SESEC

Horizontal:

- China Standards 2035
- Belt and Road Initiative
- Standardization Reform
- Institutional Changes in Chinese Government
- **Market Access (e.g CCC)**

Digital Transition

- IT in General
- Data
- Artificial Intelligence
- Quantum
- Industrial IoT
- 5G/6G

Green Transition:

- Energy Efficiency
- China RoHS
- Green Product Assessment
- Decarbonization
- New Energy （e.g. Hydrogen）
- Recycling

SESEC's English Website
For European stakeholders
www.sesec.eu

www.sesec.eu

SESEC V

China Standardisation Newsletter

July – August 2025

Seconded European Standardisation Expert in China
(SESEC)

China Hydrogen Energy Standardization

SESEC June 30, 2026

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Background

The Strategic Significance of Hydrogen

As global climate governance deepens and extreme weather events heighten demands on energy resilience, hydrogen's role as a clean and efficient secondary energy source has become increasingly central to the energy transition.

It plays **three irreplaceable roles** — making hydrogen the critical piece that completes the decarbonization puzzle.

Role 1: Clean Feedstock

- Replaces fossil-based raw materials in steelmaking (coke) and chemicals (ammonia/methanol)
- Electrification cannot solve the "carbon in chemical reactions" problem — hydrogen is a critical pathway for deep industrial decarbonization

Role 2: Zero-Carbon Fuel

- Powers long-haul heavy-duty transport — trucks, shipping, aviation
- Battery energy density falls far short of hydrogen's — insufficient for long-distance, heavy-load applications

Role 3: Long-Duration Storage

- Converts variable wind and solar power into storable, transportable chemical energy
- Enables seasonal energy storage — batteries can only handle hourly-level storage

The Global Hydrogen Race

The global hydrogen industry currently stands on the eve of large-scale deployment, with significant divergence in national development pathways. As of December 2025, 66 countries and regions had released hydrogen strategies.

EU

- Positions hydrogen as a strategic pillar for energy security, economic recovery, and climate action.
- **Has issued the Renewable Energy Directive and a series of policy measures.**
- Deploys carbon tariff mechanisms and hydrogen certification systems.
- Policy-driven approach to scale green hydrogen.

Japan

- Building a "hydrogen society" with world-leading fuel cell technology.
- Pursues technology exports and international supply chain development.
- Constrained by limited domestic energy resources and market size — shifting focus from domestic to global deployment.

U.S.

- Technology-first approach — world-leading in hydrogen liquefaction, SAF synthesis, and hydrogen gas turbines.
- Shapes competitive advantage through R&D and industrial clusters.
- **ANSI launched its Hydrogen Standards Coordination Initiative in February 2026,** currently building a standards database and identifying gaps.

China

- Has built an integrated value chain of the hydrogen industry with its complete new energy industrial system and leading renewable installed capacity
- Breakthroughs in electrolyzer manufacturing and commercial vehicles.
- **Still catching up in "soft power": basic materials, core equipment, storage infrastructure, and international standards.**

02

China Hydrogen Policy

Medium and Long-Term Plan (2021–2035) — Strategic Positioning & Targets

Medium and Long-Term Plan for Hydrogen Energy Industry Development (2021-2035)

Issued in March 2022 by the National Development and Reform Commission and the National Energy Administration

China's **first national-level master plan for the hydrogen industry,** serving as the foundational framework for China's hydrogen governance.

Three strategic positions of Hydrogen

An important component of the future national energy system

Leveraging hydrogen's role in large-scale renewable utilization and long-duration energy storage to enable cross-regional and cross-seasonal optimization of heterogeneous energy sources

A key carrier for green and low-carbon end-use energy transition

Promoting the decarbonization of energy consumption in transport, industry, and other high-emission sectors through hydrogen adoption

A strategic emerging industry and future industry development priority

Accelerating breakthroughs in hydrogen-specific core technologies and key materials to drive industrial upgrading and create new growth drivers

Three-phase targets

Phase I: By 2025

- ✓ Policy & Tech: Improve regulatory framework; master core manufacturing technologies.
- ✓ Supply: Local-use system based on industrial by-product H_2 & renewable H_2.
- ✓ Fleet: ~50,000 fuel cell electric vehicles (FCEVs) + supporting refueling stations.
- ✓ Green H_2: 100,000–200,000 tons/year from renewables.
- ✓ Decarbonization: 1–2 million tons/year CO_2 reduction.

Phase II: By 2030

- ✓ Tech System: Complete innovation system across full H_2 value chain.
- ✓ Green Supply: Establish clean-energy-based H_2 production & supply infrastructure.
- ✓ Spatial Layout: Rational, orderly industrial distribution aligned with regional resources.
- ✓ Wide Application: Renewable H_2 widely deployed.
- ✓ Strategic Impact: Strongly support the national carbon peaking goal.

Phase III: By 2035

- ✓ Industrial System: Complete H_2 industrial ecosystem across the full value chain.
- ✓ Application Ecosystem: Multi-sector H_2 deployment covering transport, energy storage, and industry.
- ✓ Energy Mix: Renewable H_2 accounts for a significantly higher share of end-use energy consumption.
- ✓ Strategic Role: Become a key pillar supporting the green energy transition.

Medium and Long-Term Plan (2021–2035) — Five Key Tasks

Beyond targets, the Plan establishes five priority tasks covering innovation, infrastructure, diversified applications, standards, and institutional frameworks — providing a complete implementation blueprint for China's hydrogen policy.

Task 1: Build an innovation system

Tech R&D: Breakthroughs in fuel cells, electrolyzers, infrastructure; safety mechanisms (H_2 embrittlement, leakage/combustion)

Platforms: Build labs, engineering centers, innovation hubs; empower SMEs

Develop a skilled workforce

Global Collaboration: Joint R&D, international standards, Belt & Road cooperation.

Task 2: Develop infrastructure

Production

Localized routes:

- by-product H_2 for local use;
- renewable H_2 demo + seasonal storage;
- Advance photolysis/seawater/nuclear-based H_2;
- build production bases.

Storage & Transport

- Optimize high-pressure H_2;
- Promote liquid H_2;
- Explore novel storage;
- Pilot H_2 pipelines.

Refueling

- Demand-based deployment; Convert existing stations;
- Pilot on-site production+storage+ refueling.

Task 3: Promote diversified applications

Deploy FCEVs (medium/heavy-duty focus), explore fuel cell applications in shipping and aviation

Pilot "wind/solar + hydrogen storage" integration

Deploy distributed combined heat and power (CHP) + backup power

Advance hydrogen metallurgy and low-carbon chemical processes (ammonia, methanol, refining)

Task 4: Establish policy and institutional safeguards

Policy: Regulate construction/operation of infrastructure; introduce supportive electricity pricing for renewable H_2; improve storage pricing mechanism; pilot H_2 storage in power market.

Standards: Full-chain standards (quality/safety/infrastructure/applications) + certification platforms.

Safety: Accountability + AI-based risk warning + emergency preparedness.

Task 5: Ensure implementation

Establish an inter-ministerial coordination mechanism

Build a "1+N" policy framework

Implement pilot and demonstration programs

Strengthen fiscal and financial support (central budget guidance, bank lending, IPO access for eligible companies)

Legal Mandate and Strategic Upgrade

Following the 2022 Plan, the 2025 Energy Law granted hydrogen legal status as "energy," and the 2026 15th Five-Year Plan elevated it to a "new economic growth driver."

The Energy Law of the People's Republic of China (Issued on Nov 9, 2024 and effective Jan 1, 2025)

- For the first time, hydrogen is legally classified as "**energy**" alongside coal, oil, natural gas, wind, and solar.
- Article 33 mandates that "the State shall actively and orderly promote the development and utilization of hydrogen energy."
- This shifts hydrogen from hazardous chemical management to energy management — fundamentally changing the institutional framework for project approval, land use, and financing.

China's 15th Five-Year Plan (2026–2030) (Issued on March 13, 2026)

- Hydrogen is listed as a "future industry" alongside quantum technology, biomanufacturing, fusion energy, brain-computer interfaces, and 6G.
- The Plan mandates that hydrogen and fusion energy "become new economic growth drivers."
- This elevates hydrogen from a component of the energy system to a strategic emerging industry and economic driver.

Supporting Policies — From System Integration to Sectoral Action

Guiding Opinions on Promoting Integrated Development of New Energy *(NEA, November 2025)*

- **Wind-Solar-H_2-Storage Integration** – Enhance electrolyzer flexibility for fluctuating renewable energy (RE); develop integrated auto-regulation systems; promote RE weak-grid/off-grid H_2 production.
- **Green H_2-based Fuel Bases** – Build RE-to-H_2/ammonia/methanol bases in resource-rich regions; develop cross-provincial transport infrastructure; promote application in coal chemical & metallurgy sectors; explore offshore wind-to-H_2/ammonia/methanol technology for marine fuel.

Auto Industry Stable Growth Action Plan (2025–2026)
(September 2025, eight ministries)

- Scaled deployment of medium/heavy-duty fuel cell commercial vehicles
- Orderly hydrogen infrastructure development

Implementation Plan for Accelerating Clean and Low-Carbon Hydrogen Application in the Industrial Sector
(December 2024, MIIT, NDRC&NEA)

- 2027 targets for clean hydrogen in steel, ammonia, methanol, and refining
- 30 tasks across six scenarios:
  1. Hydrogen substitution
  2. Hydrogen metallurgy
  3. Green methanol (hydrogen-carbon coupling)
  4. Green ammonia (hydrogen-nitrogen coupling)
  5. Hydrogen fuel cell vehicles
  6. Hydrogen-powered vessels, aircraft, and rail transit equipment
  7. Hydrogen-integrated industrial microgrids

Guiding Opinions on High-Quality Development of Energy Equipment *(September 2025, four ministries)*

- Production – High-efficiency electrolyzers adaptable to fluctuating RE; off-grid H_2 production.
- Storage & Transport – H_2-embrittlement-resistant pipe materials & carbon fiber; multi-tech storage (solid/liquid/cryo-compressed/organic); compressors & expanders.
- Application – H_2-rich blast furnaces; H_2-blended/pure H_2 turbines; high-power & high-stability fuel cells; low-energy methanol/NH_3/biomass gasification equipment.

Hydrogen Integrated Application Pilot-Policy Framework

On March 16, 2026, the Ministry of Industry and Information Technology, the Ministry of Finance, and the National Development and Reform Commission jointly issued the Notice on ***Carrying out Hydrogen Integrated Application Pilot Programs, selecting five city clusters through an "open competition" mechanism***.

The pilot expands hydrogen applications from fuel cell vehicles to diversified sectors including transportation and industry, aiming to build an integrated **"production–storage–transportation–utilization" value chain**.

Pilot Model: "1+N+X" Comprehensive Application Ecosystem

Each city cluster is expected to develop an integrated ecosystem comprising:

- 1 Universal Scenario – Fuel Cell Vehicles: Prioritising medium- and heavy-duty commercial vehicles and cold-chain logistics, with the development of hydrogen-powered highways and corridors.
- N Industrial Scenarios: Green ammonia/methanol, hydrogen-based chemical feedstock substitution, hydrogen metallurgy, and hydrogen blending in combustion – sectors with large-scale hydrogen demand capable of driving cost reduction through economies of scale.
- X Innovative Scenarios: Emerging applications including rail locomotives, maritime vessels, aircraft, combined heat and power (CHP), and stationary energy storage.

Pilot Duration and Scale

- Pilot period: 4 years
- Selected city clusters: up to 5

Hydrogen Integrated Application Pilot- Target Architecture and Support Mechanisms

2030 Core Targets

Indicator	Target
Average end-use hydrogen price	Below **RMB 25/kg (approx. €3.2/kg)** ; leading regions targeting ~**RMB 15/kg (approx. €1.9/kg)**
Fuel cell vehicle fleet	**Double** the 2025 level, targeting **100,000 vehicles**
Technology advancement	Iterative upgrades in fuel cells, electrolysers, storage and transport equipment, and materials

Central Fiscal Support: Up to RMB 1.6 Billion (approx. €203 Million) per City Cluster

- **Mechanism**: "Reward in lieu of subsidy" – funding tiers based on end-product deployment or hydrogen consumption scale.
- **Disbursement**: Funds are released in two stages: an initial advance payment upon approval to kick-start the pilot, followed by annual settlements based on verified performance results. The annual settlement is calculated as: RMB 80,000 (approx. €10,000) per performance point earned.
- **Funding orientation**: The incentive is designed to reward actual end-use consumption – the more hydrogen is consumed and the more end-products are delivered, the greater the financial support. This structure ensures that cost reductions are passed through to end-users, rather than retained upstream.

In essence, this pilot is China's commitment to scaling hydrogen from policy-backed demonstration to market-driven reality.

Policy Summary

Layer	Core Document / Event	Problem Solved
Strategic Blueprint	Medium & Long-Term Plan (2022)	"What to do and how" — first national-level master plan with a three-phase roadmap
Legal Mandate	Energy Law (2025)	"What legal status" — hydrogen formally recognized as "energy," shifting from hazardous chemical to energy governance
Strategic Upgrade	15th Five-Year Plan (2026)	"What strategic position" — elevated from "component of the energy system" to "new economic growth driver"
Sectoral Implementation	Four supporting policies (2024–2025)	"Who acts and where" — system integration, industrial application, transport deployment, equipment support
Large-Scale Validation	Integrated Application Pilot (2026)	"Does it work" — 5 city clusters, "1+N+X" scenarios, performance-based rewards, 2030 targets

China's hydrogen policy framework now forms a complete cycle — from top-level design to execution — delivering clear targets, legal safeguards, sectoral coverage, and pilot-based validation.

03

China Hydrogen Industry Landscape

3 Hydrogen Industry Landscape— Scale & Progress

China has built the world ‘s largest renewable hydrogen production capacity (accounting for over half of the global total) and established a multi-scenario application ecosystem across transport, chemicals, metallurgy, and power — and is now in a critical transition phase from demonstration and validation toward scaled commercial deployment.

Production Side

- By end-2025: renewable hydrogen production capacity exceeded **250,000** tons/year, accounting for over **50%** of global capacity
- By March 2026: renewable hydrogen production capacity in operation and under construction exceeded **1 million** tons/year

Application Side

- Transport: by end-2025, FCEV cumulative sales reached nearly **40,000** vehicles; **574** refueling stations
- Both refueling capacity and vehicle fleet size rank first globally.

Equipment Manufacturing

China's production capacity for electrolyzers and fuel cell systems each accounts for more than half of the global total, with core equipment now exported to more than 30 countries.

Core Challenges: The "Threshold" to Commercialization

- **High Costs** – End-user price >RMB 35/kg (≈€4.5/kg), far from the <RMB 25/kg (≈€3.2/kg) target by end of "15th Five-Year Plan". Cost drivers: green electricity prices + electrolyzer equipment.
- **Storage and Transportation Bottlenecks:** The difficulty and high cost of hydrogen storage and transportation are key weaknesses constraining large-scale development.
- **Incomplete Business Models**: Insufficient coordination across industry chain links has yet to form a sustainable, positive commercial cycle.

Resource https://www.pipechina.com.cn/front/news/3005252.html

- https://www.cnenergynews.cn/article/4OvP326eKAe
- https://www.desn.com.cn/news/show-2167707.html

3 Hydrogen Industry Landscape— Technology Pathways

China's hydrogen industry is transitioning from engineering demonstration to large-scale commercialization, pivoting from **"grey hydrogen" (fossil-based) to "green hydrogen" (renewable-powered)** across the full value chain.

Production Side

- **Alkaline Water Electrolysis (ALK):** Mature, cost-effective, dominant route (e.g., Xinjiang Kuqa project).
- **Proton Exchange Membrane Electrolysis (PEM)**: Better grid-flexibility, but key materials (membranes) lag behind global leaders.
- **Solid Oxide Electrolysis Cells (SOEC) & Anion Exchange Membrane Electrolysis (AEM):** High efficiency (SOEC) and low-cost potential (AEM), both at early engineering stage.
- **Seawater Electrolysis**: Pilot-scale units have commenced trial operations, offering an innovative solution for offshore green hydrogen supply along coastal regions.

Storage and Transport: "Gas–Liquid–Solid" System

- **High-pressure gaseous**: Most mature; 70MPa Type IV cylinders in mass production; H_2-blended natural gas pipelines demonstrated in Inner Mongolia and Ningxia..
- **Liquid hydrogen**: 5-ton/day liquefaction systems operational, approaching advanced global standards.
- **Solid-state**: Magnesium-based storage improving density; demo in forklifts and drones.
- **Impact**: Reduces transport costs; supports near-term regional optimization and long-term inter-regional allocation.

Application (Beyond Transport)

- **Transport**: Pioneering sector; heavy-duty fuel-cell trucks reach 1,000 km range. Target: 100,000 FCEVs by 2030.
- **Industry**: Green H_2 for steelmaking (Direct Reduced Iron, cuts CO_2 >70%), refining, and chemicals.
- **Power**: MW-class pure hydrogen gas turbines have completed full-scale testing, while Solid Oxide Fuel Cell (SOFC) cogeneration efficiency continues to improve, offering efficient solutions for distributed energy and grid peak-shaving.

Key Takeaway: Targeting cost reduction, core tech independence, and multi-sector decarbonization during the "15th Five-Year Plan" (2026–2030).

3 Hydrogen Industry Landscape— Future Development

The "15th Five-Year Plan" outlines green hydrogen as a **key emerging industry**, calling to extend the green hydrogen value chain toward green ammonia, methanol, and sustainable aviation fuels (SAF), and expand applications across transportation, power generation, and industrial sectors.

Scale Targets (By 2030)

- Renewable hydrogen production equipment capacity reaches **100 GW**
- Hydrogen accounts for over **5%** of final energy consumption
- Green hydrogen demand reaches **2.4–4.3 million tons/year**

Cost Reduction Targets (By 2030)

- **Production**: Renewable hydrogen cost falls below **RMB 15/kg (approx. €1.9/kg)** — below **RMB 10/kg (approx. €1.3/kg) in resource-rich regions**
- **Storage & Transport**: Cost per 100km drops by over 50% vs. 2025
- **End-use**: Transport hydrogen cost below **RMB 25/kg (approx. €3.2/kg)** ; industrial hydrogen cost on par with natural-gas-based hydrogen; green marine fuels cost-competitive with heavy fuel oil under carbon tariff mechanisms

Market Potential (By 2030)

Total industry chain value is expected to exceed **RMB 1 trillion (approx. €128 billion),** forming a virtuous cycle of "cost reduction → volume growth," with hydrogen deeply integrated into industrial decarbonization and transportation transformation.

04

China Hydrogen Energy Standardization

4 China's Hydrogen Energy Industry Standard System Architecture

On July 26, 2023, Six government bodies including SAC, NDRC, MIIT, MEE, MEM, and NEA jointly issued the ***Guidelines for the Construction of the Hydrogen Energy Industry Standard System (2023 Edition)*.**

The Guidelines implement the *Medium- and Long-Term Plan for the Development of the Hydrogen Energy Industry (2021–2035)* and the *National Standardization Development Strategy*, leveraging hydrogen in modern energy systems and low-carbon transition, and **establishing a comprehensive standard system that supports and guides the entire value chain – production, storage, transport, and application**.

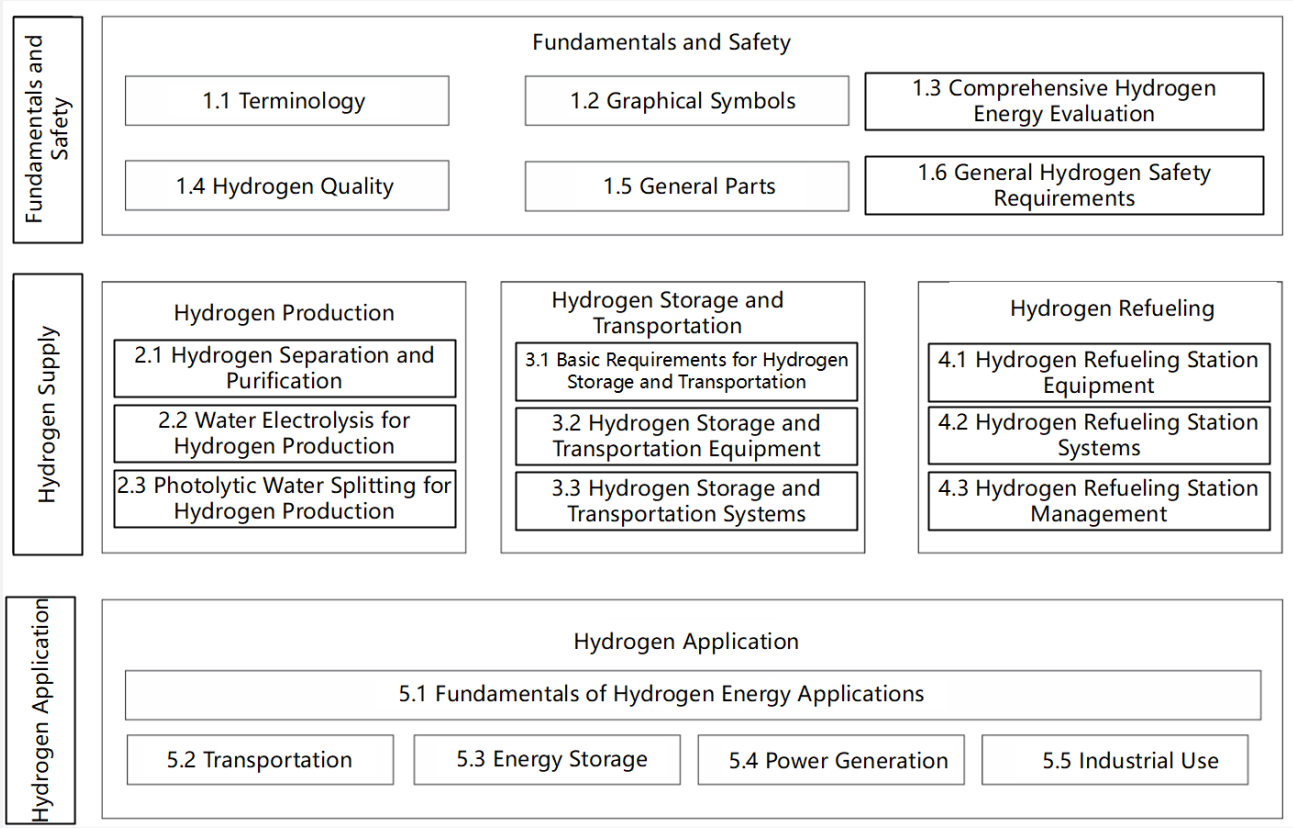
Development Targets (by 2025)

- ✓ A foundational standard system covering the entire hydrogen value chain shall be essentially established;
- ✓ **30 or more** national and sector standards for hydrogen energy are to be developed or revised;
- ✓ Priority areas include: hydrogen quality testing, hydrogen safety, renewable-energy-based water electrolysis, high-pressure storage vessels, liquefaction equipment, pipeline transport, refueling stations, fuel cells, and fuel cell vehicles;
- ✓ International standardization: **≥5** international standards to be adopted, and **≥3** new international standard proposals to be submitted.

4 China's Hydrogen Energy Industry Standard System Architecture

China's hydrogen energy standard system comprises five major subsystems – **Foundation and Safety, Hydrogen Production, Hydrogen Storage and Transport, Hydrogen Refueling, and Hydrogen Applications** – further broken down into 20 secondary subsystems and 69 tertiary subsystems.

Hydrogen Energy Industry Standard System



Core Content of the Five Subsystems

1. **Foundation and Safety** – Sets baseline safeguards for the entire value chain, addressing critical issues including leak detection and hydrogen embrittlement prevention.
2. **Hydrogen Supply** – Covers the full "Production–Storage–Transport–Refueling" chain, specifying requirements for electrolysis, high-pressure/liquid hydrogen storage, and refueling station operations.
3. **Hydrogen Applications** – Enables diverse end-use scenarios: fuel cell vehicles and vessels in transportation, system efficiency and grid integration in energy storage/power generation, and deep decarbonization in industry (e.g., hydrogen metallurgy, green ammonia).

A multi-tiered system spanning foundational safeguards – supply chain support – end-use applications.

4 Overview of Hydrogen-Related Standardization Technical Committees

01 National Technical Committee for Hydrogen Energy Standardization (SAC/TC 309)

Core responsibility: Full hydrogen chain (production, storage, transport, utilization)

02 National Technical Committee for Fuel Cells and Flow Batteries Standardization (SAC/TC 342)

Core responsibility: Fuel cells and flow batteries

03 National Technical Committee 31 for Gas Cylinders Standardization (SAC/TC 31)

Core responsibility: Composite cylinders for hydrogen storage

04 National Committee 114 for Road Vehicles Standardization (SAC/TC 114)

Core responsibility: Fuel cell electric vehicles

05 National Technical Committee for Energy Fundamentals and Management Standardization (SAC/TC 20)

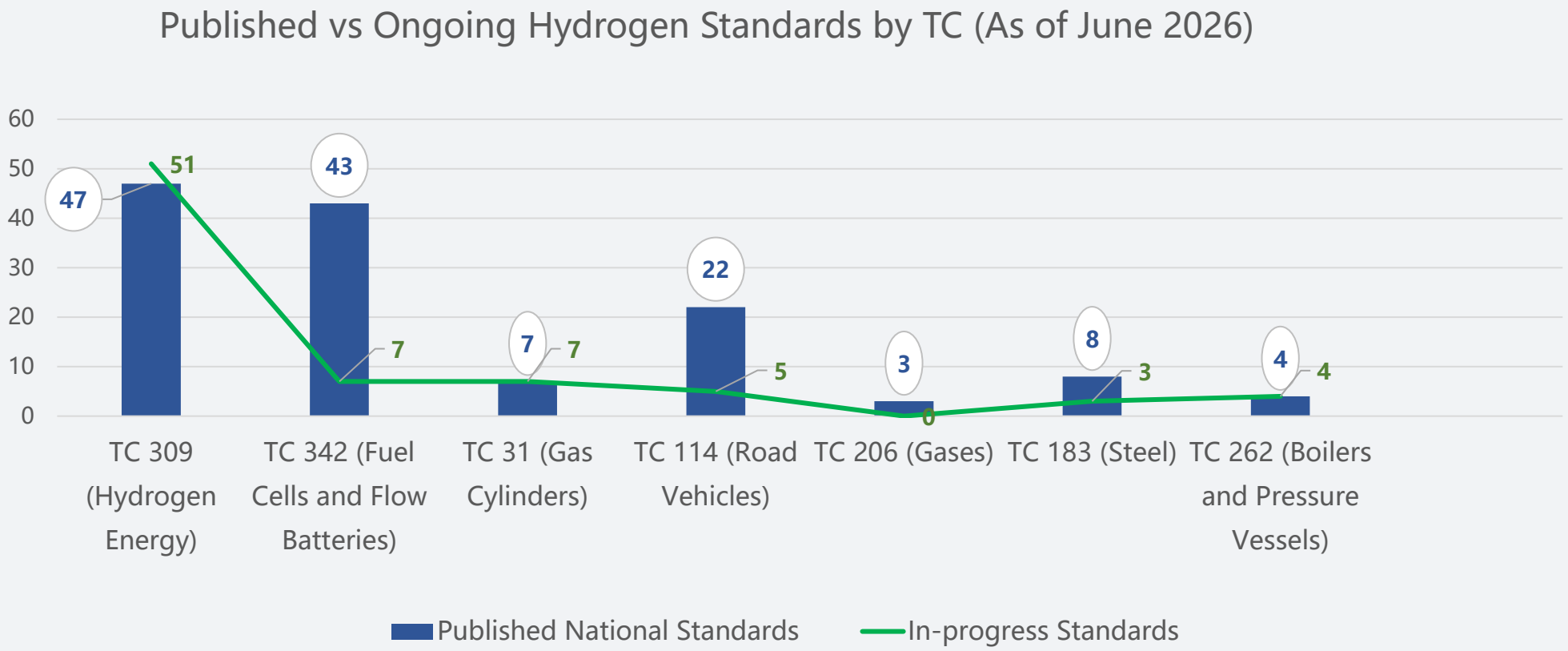
Core responsibility: Energy conservation, and general, comprehensive foundational and management aspects of energy

06 Related Material and Equipment TCs
e.g., SAC/TC206(Gases), SAC/TC183 (Steel), SAC/TC262 (Boilers and Pressure Vessels)

Core responsibility: Foundational standards for key materials and equipment

4 Hydrogen Standards Development by Technical Committee

By June 2026, China's hydrogen-related technical committees have collectively issued **134** standards and have **77** under development, with **SAC/TC 309 (Hydrogen Energy) and SAC/TC 342 (Fuel Cells and Flow Batteries) together accounting for over 70% of the total**, reflecting their central role in driving China's hydrogen standardization efforts.



4 Overview of Hydrogen Standard International Adoption

As of June 2026, China has issued 134 national hydrogen-related standards, with 77 projects under development. Among these, **47 standards (issued + in-progress)** have explicitly adopted international standards, representing approximately **22% of all these standards**.

Primary sources of adopted standards: **ISO** and **IEC**

Key trend: Shifting from "non-equivalent" (MOD) to "identical" (IDT) adoption, with significantly accelerating alignment.

TC	Scope	Total Adopted	Issued	In-progress	IDT Share
TC342 (primarily IEC)	Fuel Cell Systems	**19**	18	1	**68%**
TC309 (primarily ISO)	Full Hydrogen Chain	**18**	6	12	39%

Key takeaways

1. Hydrogen Refueling Station Standards (ISO 19880 Series Under Rapid Adoption)

- now covering General Requirements, Valves, Hoses, O-rings, and Fuel Quality Control
- Equipment market access standards rapidly taking shape.

2. Hydrogen Production via Water Electrolysis — IDT to *ISO 22734-1:2025*

- A key in-progress national standard *20261610-T-469* aligning with the latest ISO edition *ISO 22734-1:2025 Hydrogen generators using water electrolysis — Part 1: Safety*
- Critical compliance benchmark for hydrogen production equipment manufacturers

3. Greenhouse Gas Emission Accounting for Hydrogen Production — IDT to *ISO 19870-1*

- In-progress national standard *20262693-T-469* identical to *ISO 19870-1:2026 Hydrogen technologies — Methodology for determining the greenhouse gas emissions associated with the hydrogen supply chain — Part 1: Emissions associated with the production of hydrogen up to the production gate*
- Also adopted by the EU as *EN ISO 19870-1*
- Critical for emissions data interoperability across China-EU hydrogen supply chains

4 SAC/TC 309 (Hydrogen Energy)-Introduction

SAC/TC 309 – National Technical Committee for Hydrogen Energy Standardization

- **Established**: 2008
- **Secretariat**: China National Institute of Standardization (CNIS)
- **Current Composition**: 3rd Session – 53 member organizations, 54 committee members, 35 observers
- **Mirror organization**: ISO/TC 197 (Hydrogen Technologies)

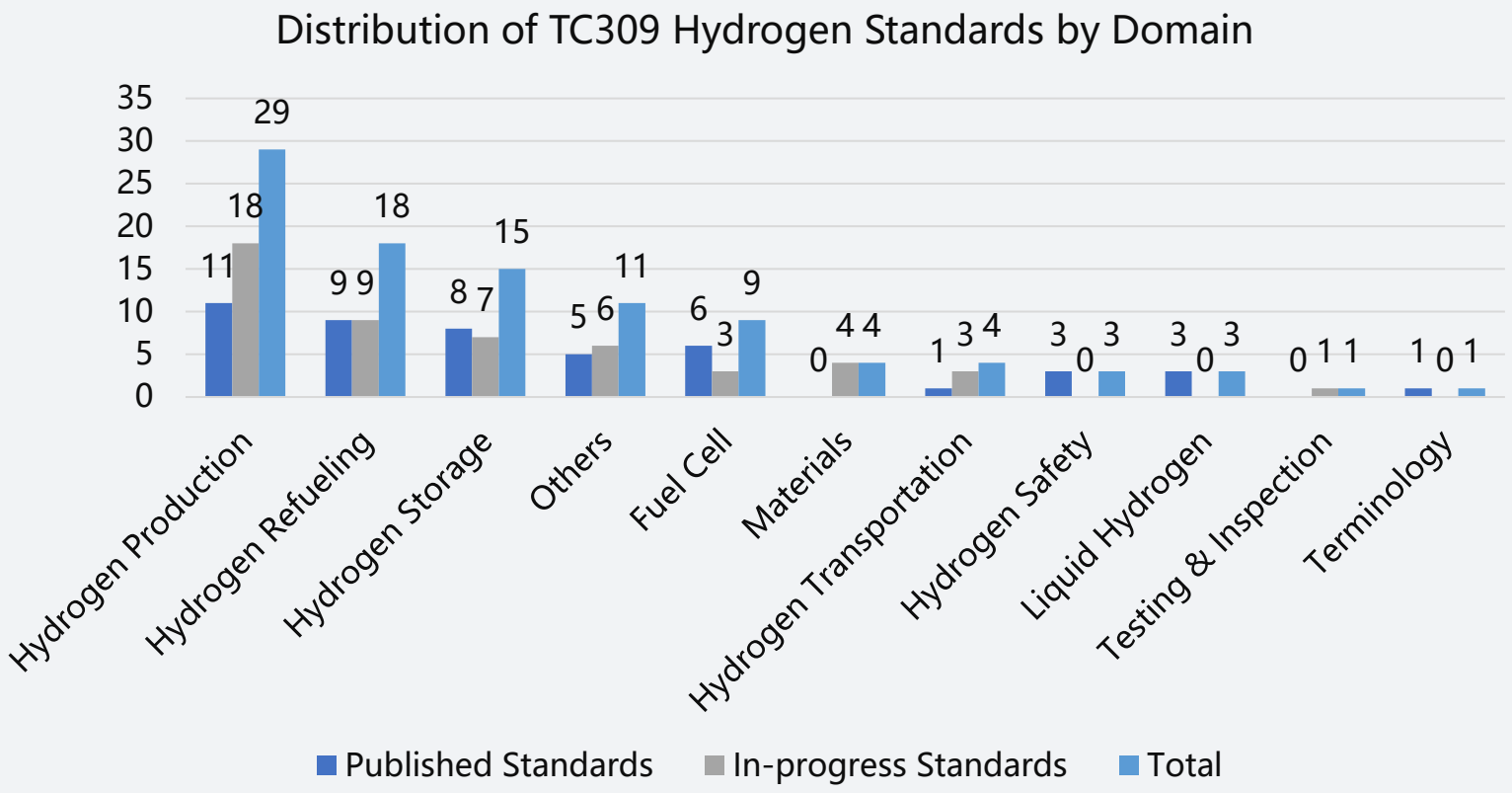
Core Responsibilities

- Research on national, sector, and association standards for hydrogen production, storage, transportation, refueling stations, safety, and testing
- Research on hydrogen industry policies and planning
- Establishes a comprehensive standardization framework covering fundamental management, quality, safety, engineering construction, production and purification, storage, transportation and refueling, applications, and testing

Standardization Outcomes (as of June 2026)

- Published national standards (Effective): **47**
- In-progress standards: **51**

4 SAC/TC 309 (Hydrogen Energy)-Standards Progress



Key Takeaways

1. Hydrogen Production is the #1 Priority

- 29 standards (31.9%), with 18 under development – the highest among all domains
- Covers four technology routes: PEM, Alkaline, AEM, and SOEC
- Focus shifting from "complete systems" to test methods for core components (membranes, catalysts, electrodes, separators)

2. Refueling Infrastructure – Balanced Maturity

- Published (9) and under development (9) are equal in number
- Under development focus on station control systems, data collection, and component-level specs (hoses, O-rings)

3. Emerging Areas – Accelerating Development

- **Liquid Hydrogen**: expanding from storage/transport to transfer technology and refueling protocols (3 under dev.)
- **Pipeline Transmission**: integrity management and hydrogen blending into natural gas grids (3 under dev.)
- **Materials**: building a systematic evaluation framework for metallic and non-metallic materials in hydrogen environments (4 under dev., all in progress)

4 SAC/TC 342 (Fuel Cell and Flow Battery)-Introduction

National Technical Committee for Fuel Cells and Flow Batteries Standardization (SAC/TC 342)

- **Established**: 2008
- **Secretariat**: Machinery Industry Beijing Electrotechnical Institute of Economic Research (ITEI)
- **Current Composition**: 3rd Session – 150 member organizations, 83 committee members, 86 observers
- **Mirror organization**: IEC/TC 105 (Fuel cell technologies)

SAC/TC 342's standardization framework covers six key areas:

- Fundamentals
- Fuel cell systems
- Stationary fuel cell power systems
- Portable fuel cell power systems
- Micro fuel cell power systems
- Fuel cell systems for propulsion and auxiliary power

Hydrogen-related Standardization Outcomes (as of June 2026)

- **43** Published national standards (Effective):Full coverage of application scenarios, including on-road vehicles, stationary power generation, industrial vehicles, unmanned aerial vehicles (UAVs), energy storage systems, and substations.
- **7** National standards projects: Component-level testing (membranes, voltage inspection modules); system-level performance and safety (backup power, control systems, noise); AEM

4 SAC/TC 114 (Road Vehicles)

National Committee 114 for Road Vehicles Standardization (SAC/TC 114)

- **Established**: 1988
- **Secretariat**: China Automotive Technology and Research Center Co., Ltd. (CATARC)
- **Mirror organization**: ISO/TC 22 (Road vehicle)& IEC/TC 69 (Electrical power/energy transfer systems for electrically propelled road vehicles and industrial trucks)

Hydrogen-related Standardization Outcomes (as of June 2026)

- **22** Published national standards:
- **5** National standards projects:

Key takeaway

1. Published standards have formed a relatively complete system

- They cover the entire chain of fuel cell electric vehicles, ranging from terminology and definitions → vehicle safety → dynamic performance → energy consumption and range → engine and components → hydrogen refuelling interfaces → operation and maintenance.

2. Standards under development reflect three major areas of expansion

- **Safety requirements upgraded to mandatory**: The standard ***20256776-Q-339 Fuel cell electric vehicles—Safety requirements*** is being upgraded from **a recommended national standard to a mandatory one**. The revision is currently in the drafting stage.
- **Diversification of technology pathways**: Expanding from pure fuel cell technology to hydrogen/natural gas hybrid fuel systems and hydrogen internal combustion engines.
- **Expansion of scope**: Extending from four-wheel vehicles to electric motorcycles.

4 SAC/TC 31 (Gas Cylinders) & SAC/TC 20 (Energy Fundamentals and Management)

National Technical Committee 31 for Gas Cylinders Standardization (SAC/TC 31)

- **Established**: 1983
- **Secretariat**: Beijing Tianhai Industry Co., Ltd.
- **Mirror organization**: ISO/TC 58 (Gas cylinders)

Hydrogen-related Standardization Outcomes (as of June 2026)

- **7** Published national standards: focus primarily on high-pressure gaseous hydrogen onboard storage, covering cylinder products, periodic inspection and evaluation, combination valves, and material compatibility testing.
- **7** National standards projects: focus primarily on high-pressure gaseous hydrogen onboard storage, covering cylinder products, periodic inspection and evaluation, combination valves, and material compatibility testing.

National Technical Committee for Energy Fundamentals and Management Standardization (SAC/TC 20)

- **Established**: 1981
- **Secretariat**: China National Institute of Standardization (CNIS)
- **Mirror organization**: ISO/TC 301 (Energy management and energy savings)

Hydrogen-related Standardization Outcomes (as of June 2026)

1 Published national standards: *GB 32311-2015 Minimum allowable values of energy efficiency and energy efficiency grades for hydrogen producing systems by water electrolysis*

4 SAC/TC206(Gases), SAC/TC183 (Steel)& SAC/TC262 (Boilers and Pressure Vessels)

Dimension	SAC/TC 183 (Steel)	SAC/TC 262 (Boilers and Pressure Vessels)	TC 206 (Gases)
Published Standards	**Number: 8** **Covered areas:** • Hydrogen-compatible steel products • Hydrogen embrittlement/cracking test methods • Hydrogen content determination in steel	**Number: 4** **Covered areas:** • Hydrogen pipelines • Hydrogen storage vessels for refueling stations • High-pressure hydrogen storage vessels • Cryogenic valves and safety valves	**Number: 3** **Covered areas:** • Hydrogen purity grading (industrial/pure/high-purity/ultra-high-purity) • Fuel analysis methods for vehicle-use hydrogen
Standards Under Development	**Number: 3** **Covered areas:** • Stainless steel plates/strips and seamless tubes for liquid-hydrogen vessels • Test/evaluation methods for hydrogen embrittlement sensitivity of hydrogen transmission pipelines	**Number: 4** **Covered areas:** • High-pressure hydrogen storage vessels (revision) • Hydrogen liquefaction heat exchangers • Hydrogen-blended natural gas boilers • Large spherical pressure vessels for gaseous hydrogen storage	None

4 China Hydrogen Standardization: Summary

System in Place

2023 Guidelines established a standard system covering 5 subsystems, 20 secondary sub-systems, and 69 tertiary sub-systems across the entire value chain — production, storage, transport, and application.

Tangible Outcomes

As of June 2026: **134** national standards published, **77** under development; international standard adoption rate at ~**22%**, with a clear shift toward "identical" (IDT) adoption.

Clear Division of Work

Four core TCs lead the effort: TC309 (full value chain), TC342 (fuel cell systems), TC114, TC31, supported by complementary TCs.

Global Alignment Accelerating

Rapid adoption of ISO 19880 series (refueling stations), and identical adoption of ISO 22734-1 (water electrolysis safety) and ISO 19870-1 (emissions accounting)

Way Forward: Transition from "non-equivalent" to "identical" adoption; strengthen standards for green hydrogen certification, materials, liquid hydrogen, and pipeline transport; align standardization with policy and pilot programs to enable large-scale commercial deployment.

05 Summary

5 Summary

Strategic Positioning	Hydrogen is positioned as a core pillar for energy security, green transition, and new economic growth, with a complete policy framework in place from top-level design to local pilot programs.
Policy System Maturing	From the *Medium- and Long-Term Plan for Hydrogen Energy Industry Development (2021–2035)* to the *Energy Law* granting hydrogen legal status as "energy," and the launch of the "Hydrogen Integrated Application Pilot Program" in 2026, a closed policy loop has been formed.
Industry Scale Expanding	China has built substantial hydrogen production capacity, FCEV fleet, refueling infrastructure, and electrolyzer manufacturing capabilities, ranking among the leading markets globally. The industry is moving from demonstration to early-stage commercialization.
Standardization Progress	134 national standards issued, 77 in development, covering the full value chain. IDT adoption of ISO or IEC standards supports technical interoperability.
Remaining Challenges	Cost competitiveness, storage and transport logistics, and sustainable business models remain key barriers to large-scale deployment.
Standardization Outlook	Green hydrogen certification, materials, liquid hydrogen, and pipeline transport

5 Recommendations for European Stakeholders

1. Engage actively in China's hydrogen standardization process

China is accelerating IDT adoption of ISO/IEC standards (e.g., ISO 22734, ISO 19870). European companies and technical bodies could enhance their influence in the process.

2. Explore areas with mutual recognition/cooperation potential

Green hydrogen certification, GHG accounting methodologies, and equipment safety testing could be promising areas for dialogue. Joint technical work under ISO/IEC frameworks could help reduce compliance costs for both sides in the long term.

3. Stay informed on standardization developments

Following the work of SAC/TC 309 (Hydrogen) and TC 342 (Fuel Cells) can provide useful insights.


Thank You!
Q&A