LONGi

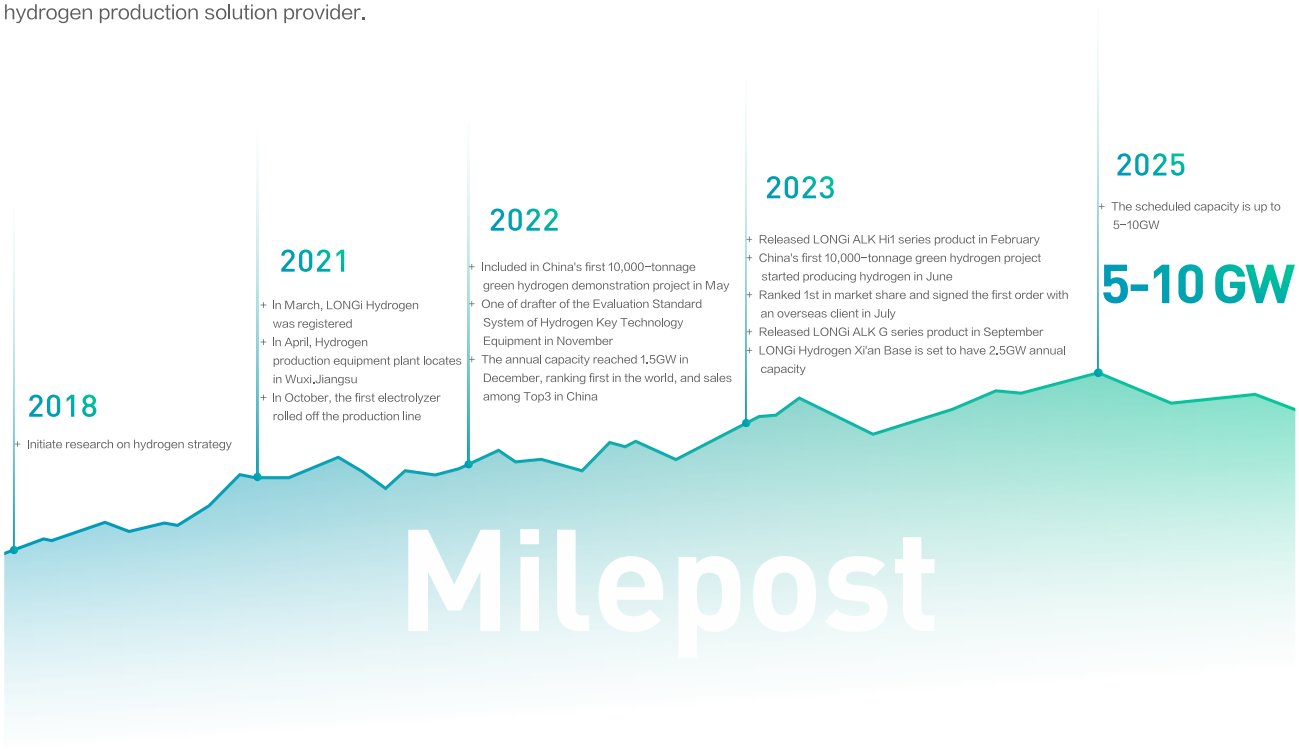
LONGi Hydrogen

www.longi.com

About LONGi

As the world's largest PV enterprise by market value, LONGi achieved an operating revenue of $17.91 billion in 2022, ranking 168th in Fortune China 500 and 724th in Forbes Global 2000.

Thanks to its strategic research on hydrogen in 2018, LONGi duly incorporated Xi'an LONGi Hydrogen Energy Technology Co., Ltd. in 2021, committed to becoming the world's leading large-scale electrolyzer and green hydrogen production solution provider.



LONGi believes that "Green Power + Green Hydrogen is a powerful solution to carbon neutrality. LONGi has always adhered to the development concept of "no capacity expansion without leading edge". By automatic upgrading of production lines and the introduction of more advanced techniques, LONGi Hydrogen will improve the safety, reliability and technological precedence of water electrolysis hydrogen production equipment.

In February 2023, LONGi Hydrogen launched the ALK Hi1 series, an consumption-reducing, efficiency-increasing series that defines a new level of energy efficiency for commercialized hydrogen production by water electrolysis. Every 0.1 kWh/Nm^3 DC power consumption reduced would bring LCOH down by 1.8-2.2%, depending on the utilization hours of the system. This is equivalent to 10-25% CAPEX cut in hydrogen production equipment, thus bringing higher efficiency and benefits to customers. In September 2023, LONGi Hydrogen released LONGi ALK G series, with the unit hydrogen production going up to 3,000Nm^3/h, saving 20% equipment investment and 30% of civil construction costs for customers. From a new high in energy efficiency to a new high in unit capacity, LONGi Hydrogen has once again made the leap.

Leading Technology
Breaking the world records for PV cell conversion efficiency for 14 consecutive times within two years

Leading R&D
More than $2.89 billion invested in R&D since its listing in 2012, ranking the first in PV industry

Leading Value
2021 Intersolar Award
The only module manufacturer winner

Reliable Product
Full life cycle management
Customer-centered

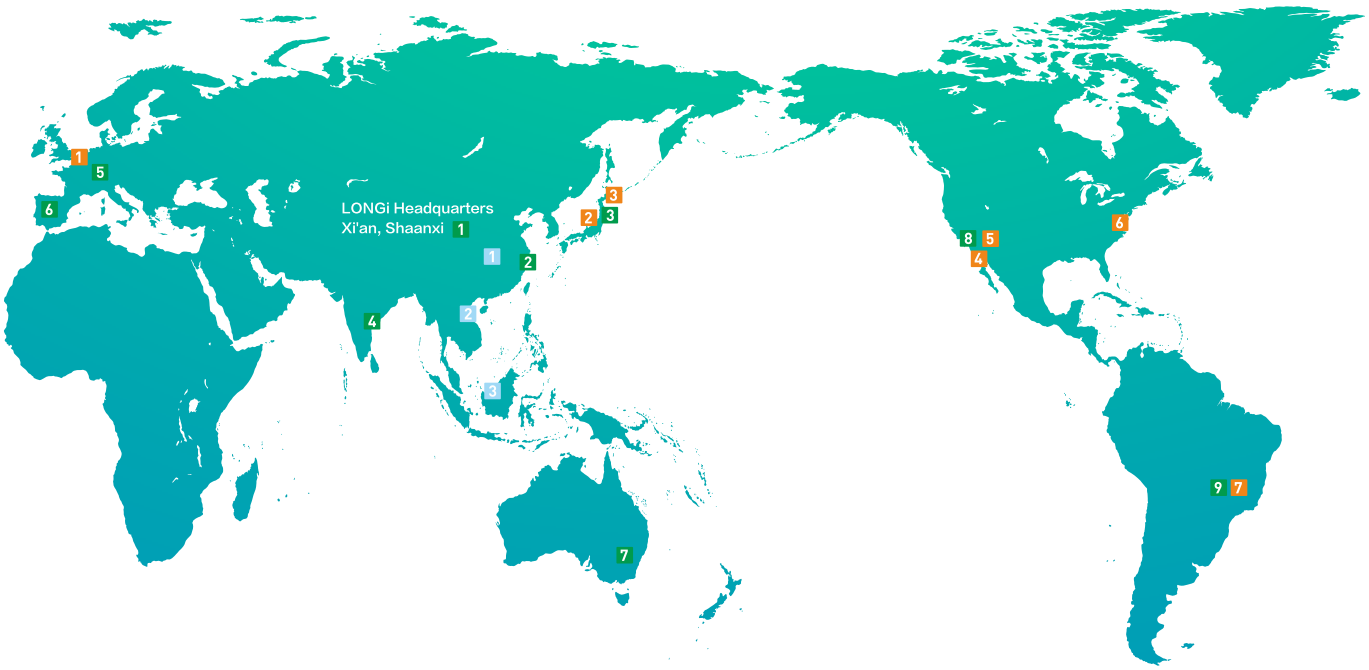
Reliable Finance
No.1 in BNEF Financial Health index
The only AAA rating for "Bankability of modules by PV Tech

Sustainable Development
RE100, EP100, EV100, and SBTi, Green Supply Chain system, and LONGi's Zero-Carbon Plant

Global Deployment

LONGi has laid out manufacturing bases in China, Vietnam, Malaysia and other countries and regions, and set up branches in Europe, America, the Middle East and Africa, Asia-Pacific and other countries, and its business covers more than 150 countries and regions.

The global sales, market share and brand influence of monocrystalline silicon wafers and modules all ranked No.1.



Global Manufacturing Base

1 Xi'an, **Shaanxi**
Wuxi/Taizhou, **Jiangsu**
Quzhou/Jiaxing, **Zhejiang**
Hefei/Chuzhou, **Anhui**
Datong, **Shanxi**
Yinchuan/Zhongning, **Ningxia**
Baoshan/Lijiang/Chuxiong/Tengchong, **Yunnan**
2 Bac Giang, **Vietnam**
3 Kuching, **Malaysia**

Global Marketing Center

1 Xi'an, **China**
2 Shanghai, **China**
3 Tokyo, **Japan**
4 New Delhi, **India**
5 **Europe Marketing Center**
6 **Europe Marketing Center**
7 Sydney, **Australia**
8 San Ramon, **USA**
9 Sao Paulo, **Brazil**

Global Logistics Center

1 Rotterdam, **the Netherlands**
2 Hakata, **Japan**
3 Tokyo, **Japan**
4 Carson, **USA**
5 Tracy, **USA**
6 New Jersey, **USA**
7 Sao Paulo, **Brazil**

6 business segments support LONGi Hydrogen's global "Green Power + Green Hydrogen" product and solution capabilities

Mono-crystalline wafer | Solar cell and module | Industrial and commercial PV solutions | Ground-mounted PV solutions | Alkaline water electrolysis hydrogen production equipment | Green power and green hydrogen solutions

New High in Energy Efficiency

High Energy Efficiency / High ROI / High Reliability

LONGi ALK Hi1 series

Commercialized Water Electrolysis Hydrogen Production Equipment

LONGi ALK Hi1 series feature high efficiency and high yield,
with the consumption going as low as 4.0kWh/Nm^3, a pioneering level in the industry.
LONGi ALK Hi1 series have been certified by authoritative institutions in accordance with GB32311–2015,
performing level 1 energy efficiency for hydrogen production systems.

LONGi Hydrogen starts the Era 1.0 of electrolysis energy efficiency,
and redefined the height of energy efficiency of commercial water electrolysis hydrogen production equipment.

Parameters	Hi1 1000	Hi1 Plus 1000
Hydrogen production (Nm^3/h)	1000	
Operating pressure (MPa)	1.6	
DC power consumption (kWh/Nm^3)	≤4.3	≤4.1
Power fluctuation range	30% – 110%	
Hydrogen purity (purified)	99.999%	
O_2 in H_2 (ppmv)	1	
Operating temperature (℃)	90 ± 5	
Ambient temperature (℃)	5 – 45	
Electrolyte	30% KOH	

OPEX

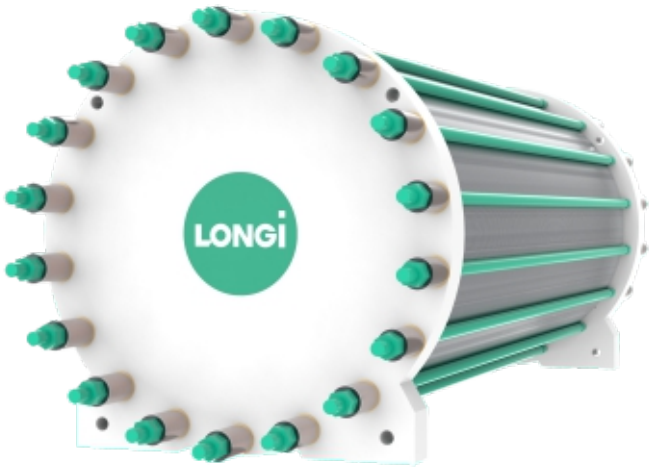
Lower DC power consumption

With 10% less DC power consumption, LCOH will see a sharp cut in different scenarios

4.0 kWh/Nm^3

Current density @2500A/m^2

@Full load standard consumption to 4.04kWh/Nm^3



- Define applicable scenarios based on specific project realities and financial assumptions.
  The number of hours depends largely on local power system conditions, policies, new energy resources, etc.

New High in Unit Capacity

Standardized / Integrated / Modular

LONGi ALK G series

Commercialized Water Electrolysis Hydrogen Production Equipment

LONGi ALK G series are positioned as large-scale commercialized green hydrogen equipment, with hydrogen production of 1200Nm^3/h, 1500Nm^3/h, 2000Nm^3/h, and 3000Nm^3/h, respectively. Compared with common 1,000Nm^3/h electrolyzers in the market, G series feature smaller and lighter unit stack, helping save CAPEX and footprint. They are applicable to chemical, smelting and steel industries with high demand for hydrogen.

3000Nm^3/h electrolyzer has the highest hydrogen production per sack in China, with the most advanced electrolyzer technology in China.

Parameters	G 1200	G 1500	G 2000	G 3000
Hydrogen production (Nm^3/h)	1200	1500	2000	3000
Operating pressure (MPa)	1.6			
DC power consumption (kWh/Nm^3)	4.3 / 4.5			
Load range	30% – 110%			
Hydrogen purity (purified)	99.999%			
Operating temperature (℃)	90 ± 5			
Ambient temperature (℃)	5 – 45			
Electrolyte	30% KOH			

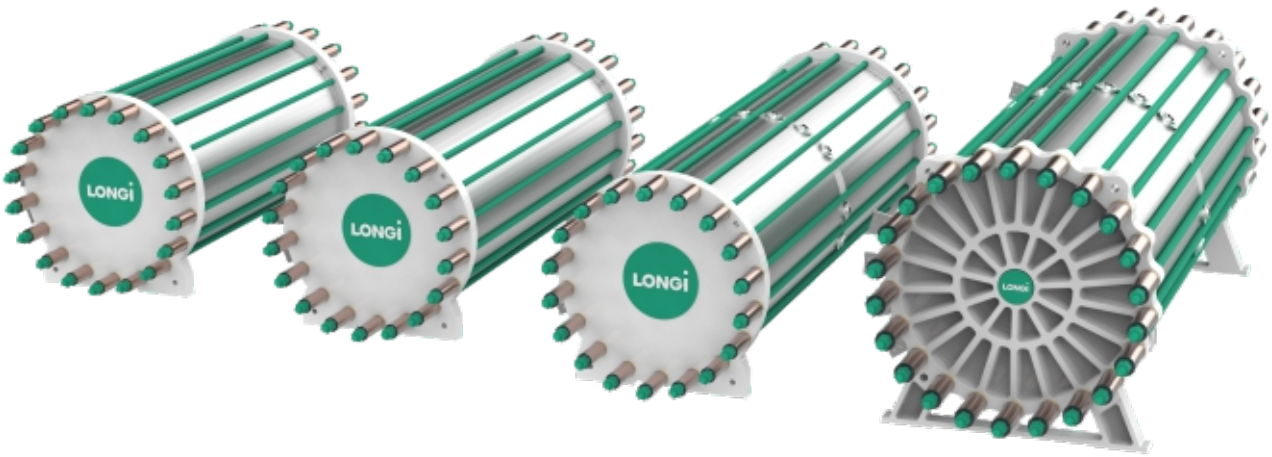
CAPEX

Larger electrolyzer sack

With 20% equipment cost and 30% civil work cost saved, LCOH will see a substantial cut in different scenarios

3000 Nm^3/h

Optimized structure, flow field and materials
ensure stable operation of large-scale electrolyzers



- Define applicable scenarios based on specific project realities and financial assumptions.
  The number of hours depends largely on local power system conditions, policies, new energy resources, etc.

Solution

Safe / Reliable / Efficient / Flexible

LONGi Green Power and Green Hydrogen Solution

Provide stable and reliable green power and green hydrogen products and better LCOH solutions

Safe

+ 24/7 monitoring
+ Full interlocking response
+ Strict quality system

Reliable

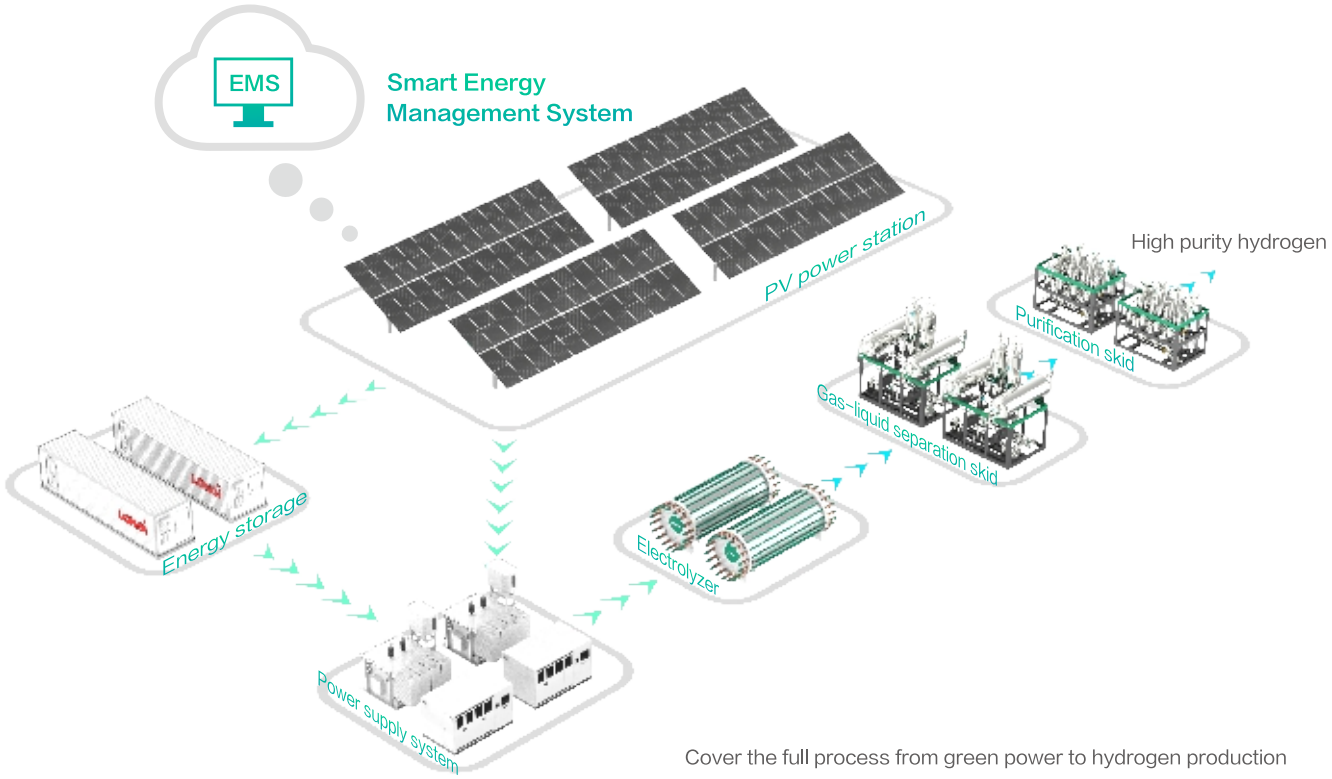
+ Full process scheme design
+ Full chain green hydrogen product supply
+ Better LCOH across life cycle

Efficient

+ Efficient PV module
+ Efficient off-grid system
+ Efficient hydrogen production system

Flexible

+ Wide-range regulation of electrolyzer
+ Post-processing fast response
+ Intelligent energy management and allocation



Cover the full process from green power to hydrogen production
Safeguard fluctuating hydrogen production systems

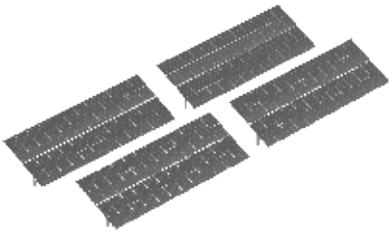
Three segments

Solution system design

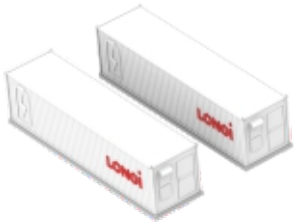
Key equipment and products

System simulation and demonstration

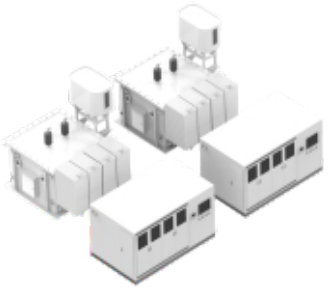
Five products



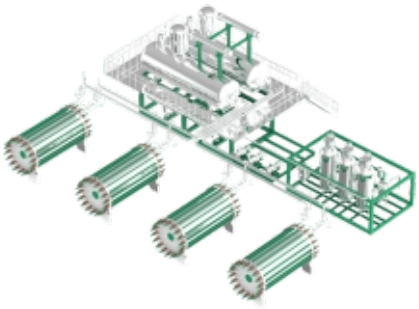
Energy supply side configuration



Grid type energy storage system



Efficient power supply for hydrogen production



Hydrogen production system



Smart Energy Management System

Hydrogen Production System

Gas-liquid Separator



Customized

Auxiliary facilities can be customized, including purification skid, thyristor/IGBT rectifier power system, water and alkali supplement.

Modular

Take the lead to introduce 4,000Nm³/h 4 to1 gas-liquid separator in the industry, saving land use by 20%.

Parameters	Measure	LHy4000
Gas handling capacity	Nm³/h	4000
Dimension	mm	10000x3600x7100
Weight	t	38

Purification Skid



Excellent energy efficiency

Optimized electrolysis cell structure and materials help improve the overpotential and ohmic loss, thus reducing the DC power consumption

Intelligent manufacturing

The first to auto-produce electrolysis cells in China, ensuring consistency and supporting excellent performance. Production raw materials are traceable

Automatic operation control

One-click startup and shutdown, without human intervention.
Automatic nitrogen displacement, multiple interlocks for safe shutdown and less operational risks. PLC redundancy design, with independent SIS (safety instrumented system)

Real-time operation monitoring

Monitor the status of raw materials and key components to ensure the operating environment at the source and realizes intelligent O&M

The Most Trusted, Reliable Solar Company that Blazes the Trail for Green Technology

For more than 20 years, LONGi has been committed to being the most trusted, reliable solar company that blazes the trail for green technology. From PV to hydrogen, LONGi is down-to-earth at every step and keeps making technological breakthroughs. Centering on quality, we have formed a complete supply chain system, independent design and processing of core components, electrolyzer assembly, skid integrated manufacturing, 24/7 delivery service and other capabilities throughout the product life cycle. LONGi has become the industry benchmark in terms of electrolyzer technology, quality, intelligent manufacturing, and energy consumption. LONGi Hydrogen has obtained more than 10 professional certificates, and is manned with a technical R&D team of over 100 members, more than 70% of whom are master and doctoral degree holders.

Brand Reliability



American Society of Mechanical Engineers (ASME) Certificate



Safety Certificate of Pressure Equipment by EU Member States



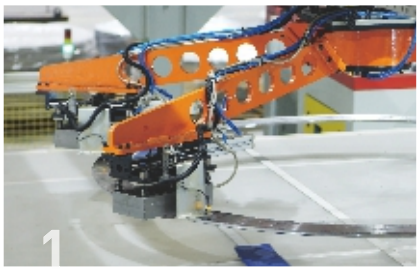
Environmental Management System Certificate ISO14001



Occupational Health and Safety Management System Certificate ISO45001

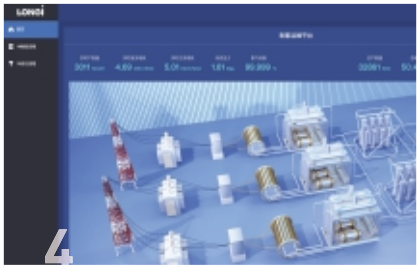
Safety Reliability

- ATEX Explosion-proof Safety Compliance
- Workplace Conditions Assessment (WCA)
- Life Cycle HAZOP Risk Assessment/SIL Authentication
- Equipment FMEA and FTA
- SIS meets IEC 61508/61511 Functional Safety Standards











System Reliability

1 Automatic production line

Fully automatic production of electrolysis cells ensures consistency and supports excellent performance.

2 Automatic control system

Multiple protection interlocks the shutdown function, plus automatic nitrogen displacement, to reduce operational risks.

3 Enhanced design protection

The gas path outlet is flanged, the separator is made of special anticorrosive materials to increase system life and minimize unplanned shutdown.

4 Intelligent O&M platform

Remote view of key information, convenient entry of O&M information, equipment fault feature extraction, and remote assisted debugging.

5 Dynamic load control

It adapts to dynamic load control and energy management of new energy.

Product Reliability

ALK technology has a 200-year history +

IS09001 International quality management system +

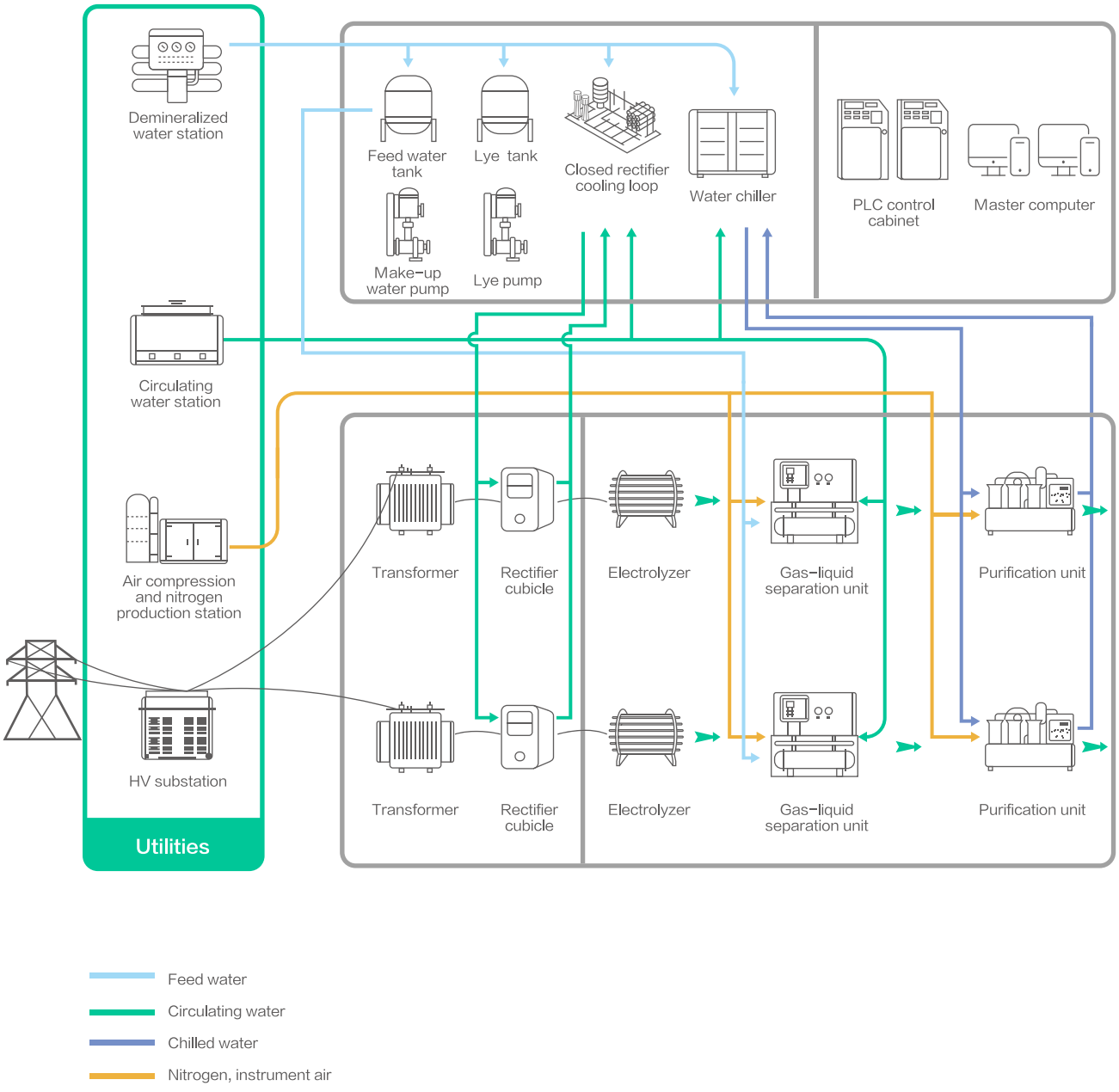
99.999% high-purity hydrogen +

A national hydrogen laboratory available +

108 patents granted/accepted +

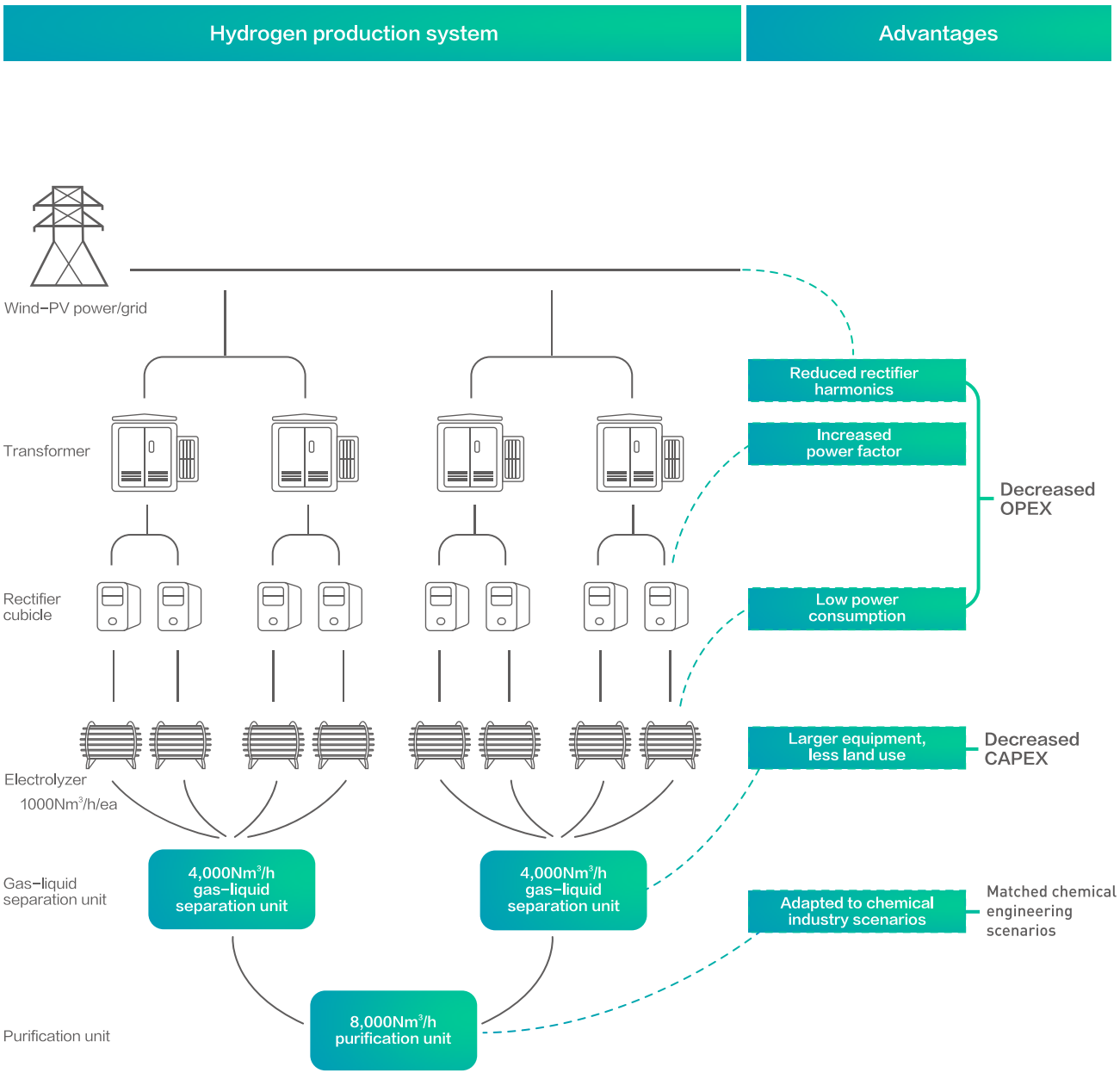
LONGi Hydrogen Products

– System structure



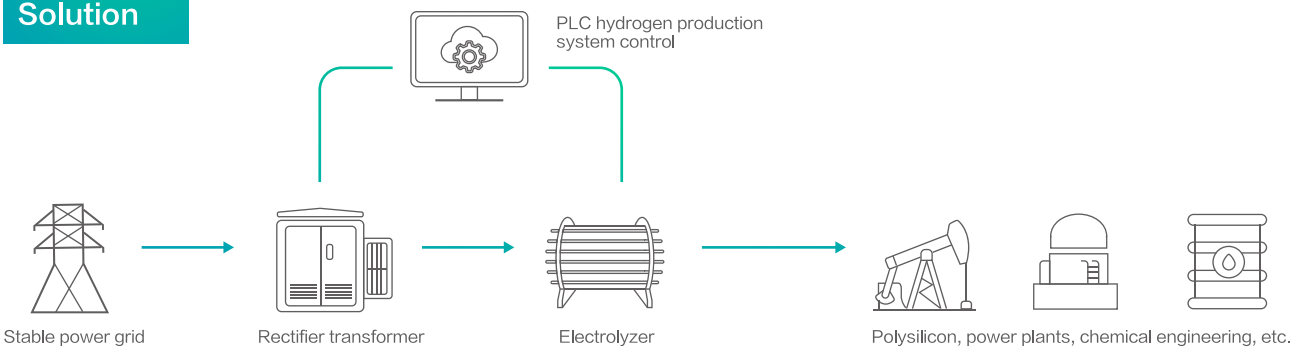
End-to-end Solution

– Optimized hydrogen production system

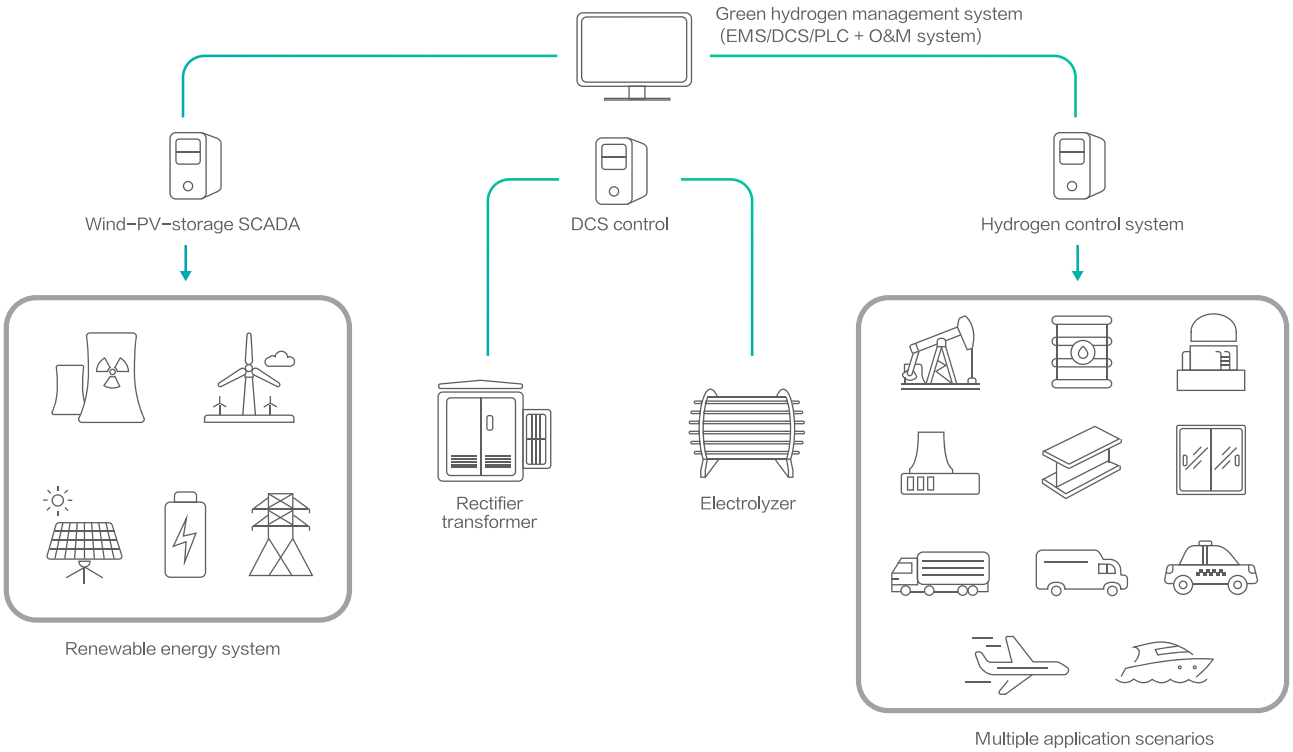


Renewable Energy End-to-end Solution

Traditional Solution



LONGi Solution

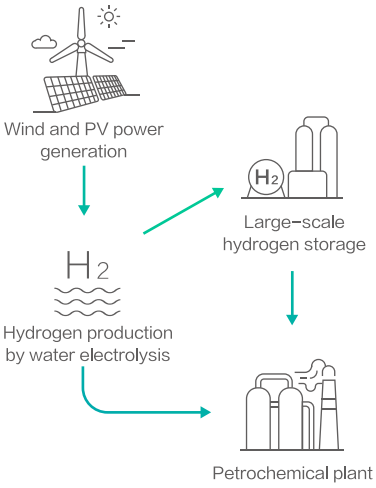


End-to-end Solution

-Wind-PV-to-hydrogen simulation system (fluctuations)

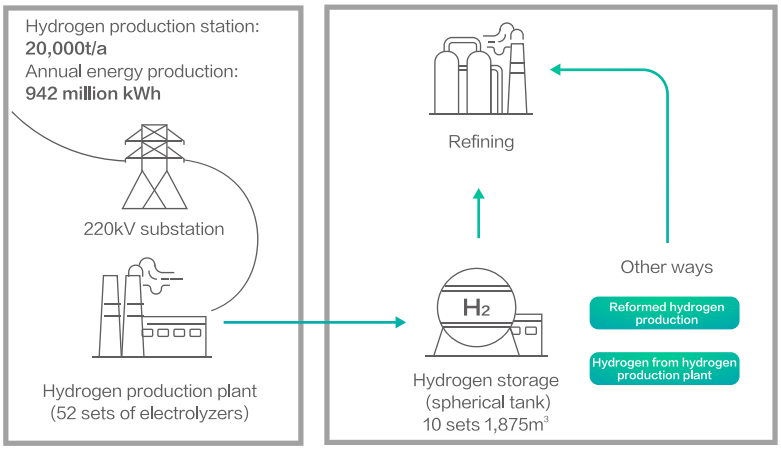
A stable hydrogen source is what downstream chemical scenarios need most. "Green hydrogen" produced with "green power" is inevitably plagued by power fluctuations, thus giving rise to fluctuations in hydrogen production. Fluctuations in hydrogen production can be solved by the combination of intermittent wind and PV power for hydrogen production and large-scale hydrogen storage.

Intermittent wind and PV power for hydrogen production combined with large-scale hydrogen storage to solve the fluctuations



Case

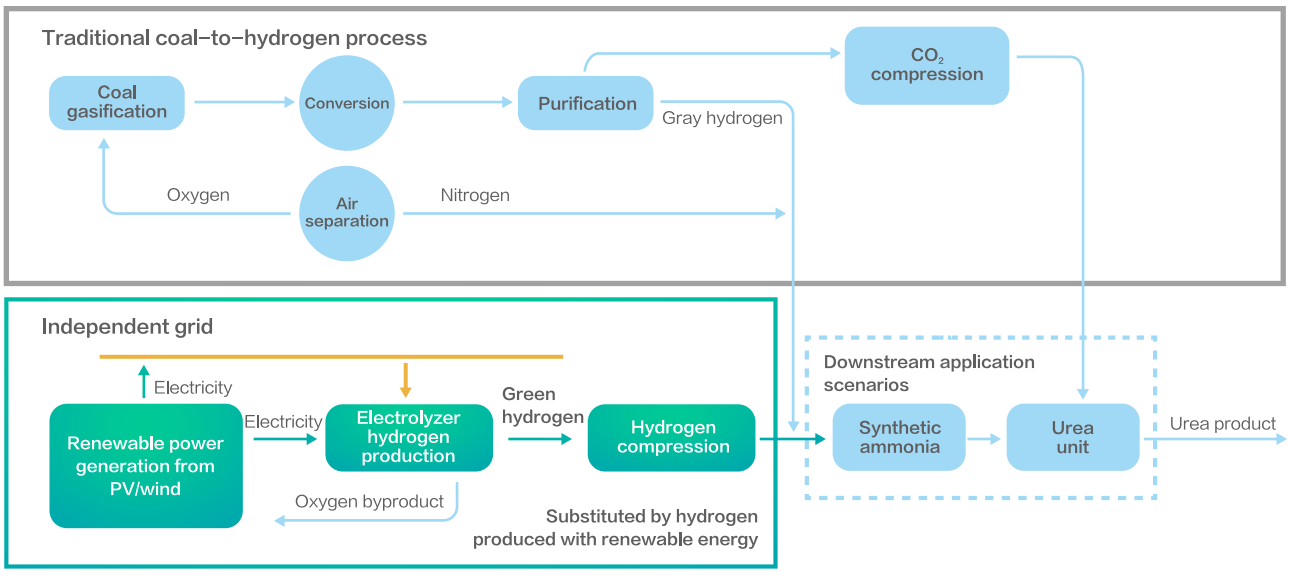
The 20,000 tons Green Hydrogen pilot project solved the fluctuations in hydrogen production through large-scale hydrogen storage.



Synthetic ammonia

(If the hydrogen sourced from coal-to-hydrogen process is replaced by green hydrogen, 100% carbon emissions will be eliminated.)

Example: 100,000t/a synthetic ammonia produced with green power and green hydrogen (1.66t coal per ton of ammonia, 2.88-3.4t CO_2 per ton of ammonia)



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