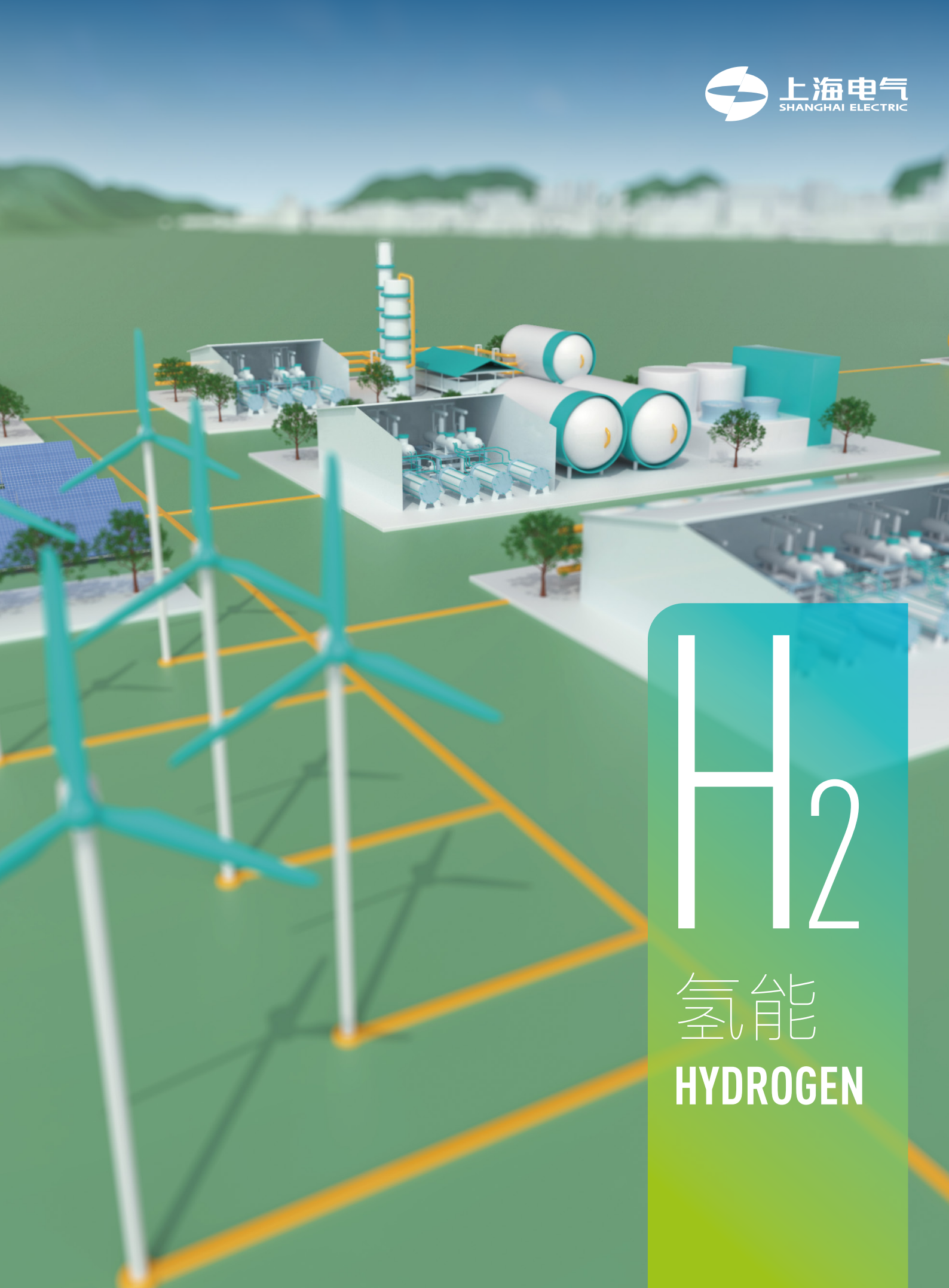
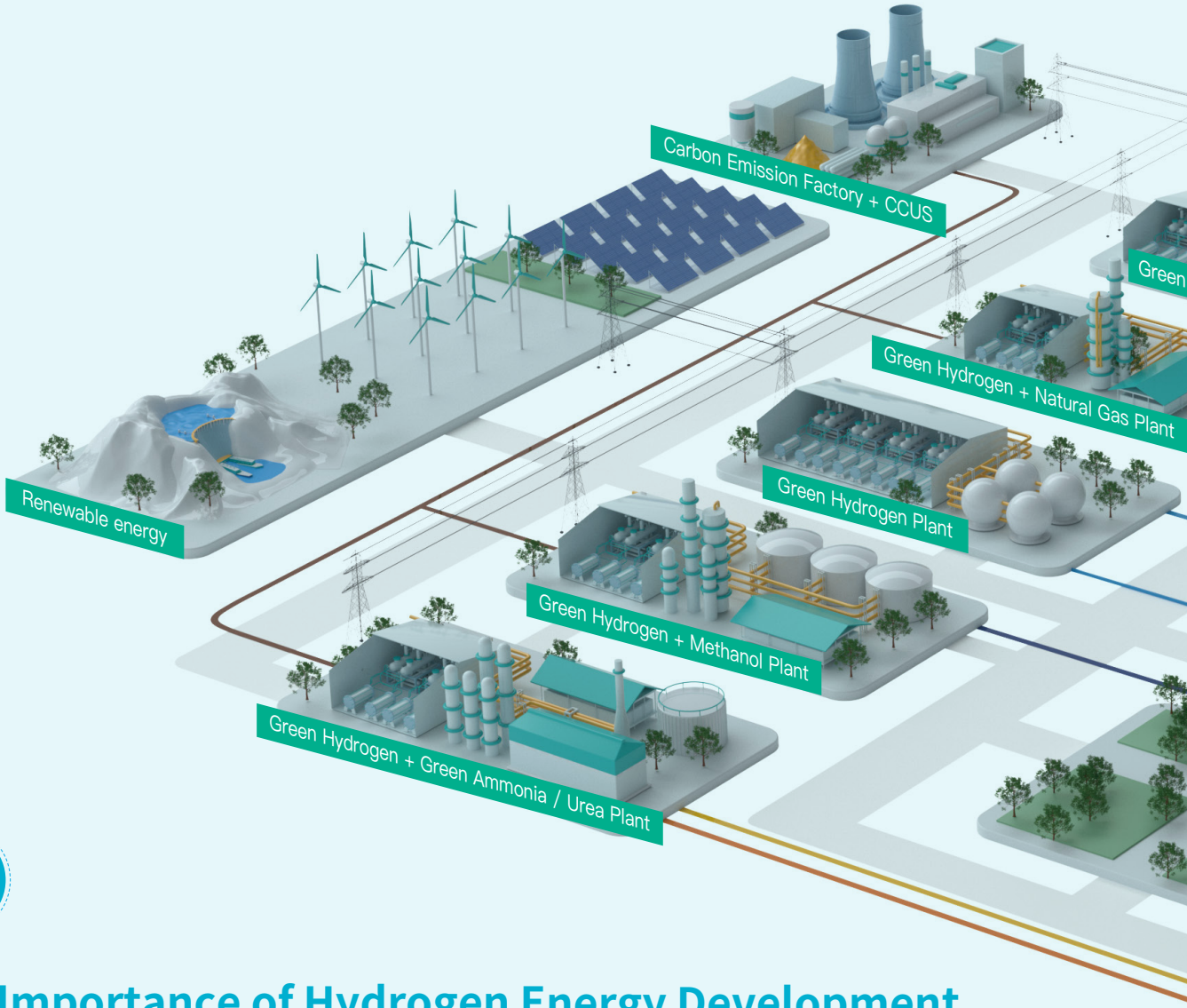
上海电气
SHANGHAI ELECTRIC



H_2

氢能

HYDROGEN



H_2

The Importance of Hydrogen Energy Development

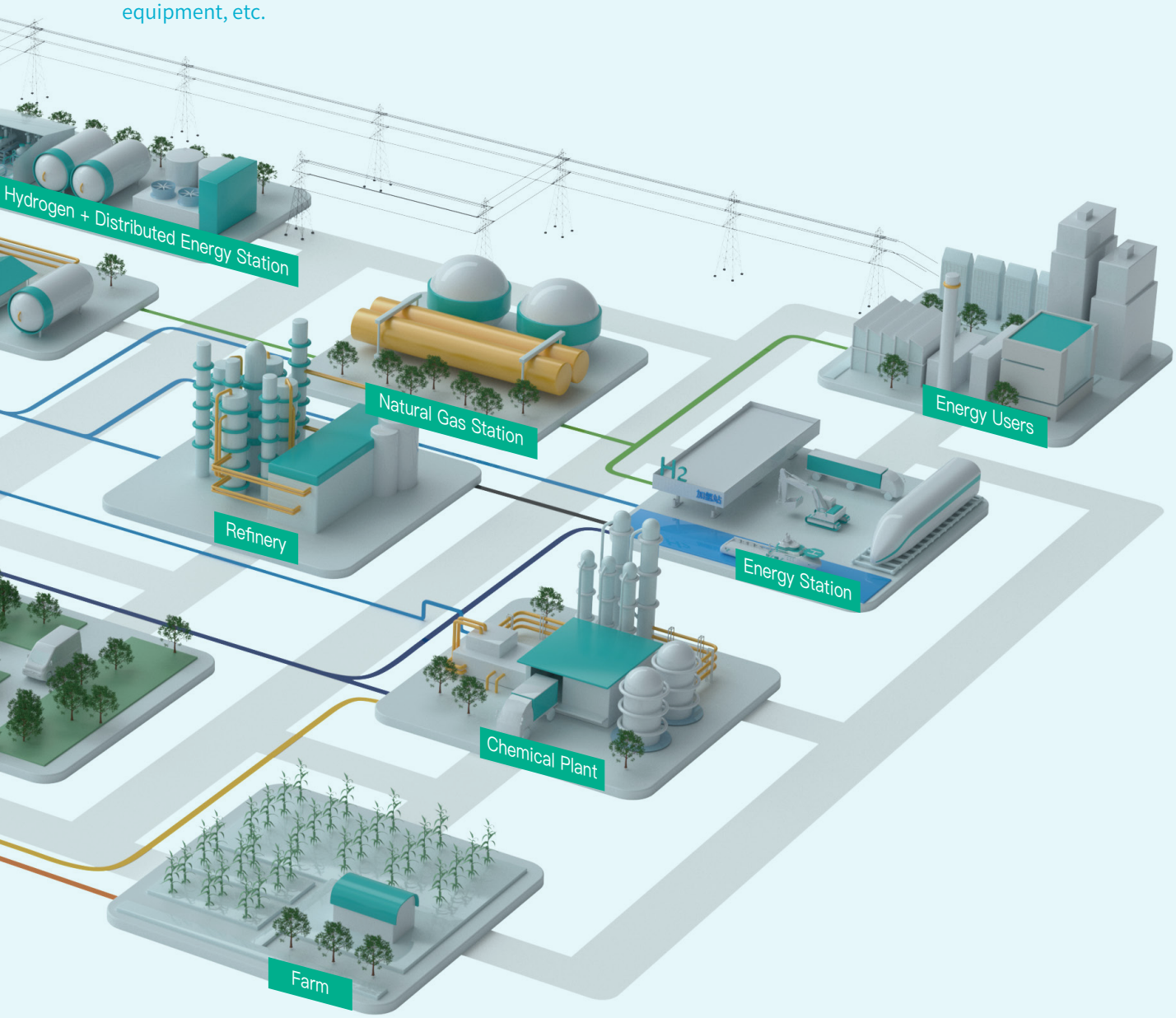
Hydrogen and electricity are common secondary energy sources. Hydrogen possesses a high energy density and simple storage methods, is an ideal choice for large-scale, long-duration energy storage, and offers variable solutions for the large-scale utilization of renewable energy. With the evolution of hydrogen utilization technology, the flexible conversion and coupled development of hydrogen-thermal-electric energy will be accomplished. Hydrogen possesses clean, low-carbon properties and high cross-sector application potential, making it widely applicable in transportation, industry, and other fields. It also serves as a high-quality alternative energy source for high-energy-consuming and high-emission industries. Broad promotion of hydrogen utilization in the energy field facilitates the significant reduction of greenhouse gas emissions.

Comprehensive Solution for the Entire Industry Chain

Shanghai Electric uses its robust technical strength and manufacturing capabilities in high-end energy equipment manufacturing and system integration to actively offer solutions in renewable energy, energy storage, hydrogen energy, power generation equipment, and chemical sectors. These efforts support the nation's grand historical goal to achieve carbon neutrality. Shanghai Electric provides customers with comprehensive service for hydrogen energy ecological project development across the entire industrial chain and EPC contracting.

Focus On Core Equipment

Shanghai Electric offers its technological expertise and supply experience in the energy sector to provide a wide range of renewable energy solutions, including onshore and offshore wind turbines and high-efficiency photovoltaic power generation equipment. For the hydrogen energy industry, Shanghai Electric supplies mature and reliable core equipment, including alkaline hydrogen production systems (ALK), proton exchange membrane hydrogen production systems (PEM), hydrogen storage devices, diaphragm compressors, fuel cells, hydrogen-blended power generation equipment, etc.



- Comprehensive solution for Hydrogen Energy Transportation:
  "Hydrogen Energy Production, Storage, and Refueling Integrated Plant".
- Comprehensive solution for Chemical and Power Plant Sectors:
  "Green Hydrogen + Carbon Capture + Green Chemical Plant."
- Comprehensive solution for Large-scale Wind and Solar Power Base:
  "green hydrogen +hydrogen storage + hydrogen blended gas turbine / boiler"
- The integrated solution for Industrial Parks:
  "Integrated Wind-Solar-Storage-Charging-Hydrogen system for comprehensive energy supply of cooling, heating, electricity, and hydrogen."

上海氢器时代科技有限公司
SHANGHAI BRIGHT-H TECHNOLOGY CO., LTD.

H2
氢能
HYDROGEN

High-power，High-performance，Modular ALK Electrolyzer and its System

Suitable for centralized and continuous hydrogen production scenario

High Power

H_2 Nominal production rate:
100-3000Nm³/h

High performance

System efficiency **>82%**
DC power consumption **<3.8 kWh/Nm³ H_2**
Hydrogen purity **>99.9995%**

Modularization

"N to 1" Design for larger scale
flexible configuration
Client-tailored service model

Safety

Triple Protection
Improved system security
Optimized leak-proof sealing structure

Flexibility

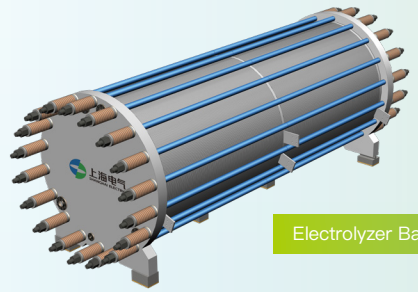
3%/s variable load rate
30% load long-time operation

Intelligent

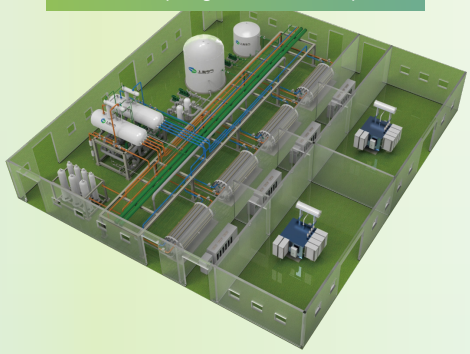
Digital design
Digital twin technology
One-button start/stop and unattended operation

100-3000Nm³/h

"N–to–1" with Alkaline Electrolyzer System



Electrolyzer Basic Unit



"N–to–1" Hydrogen Generation System

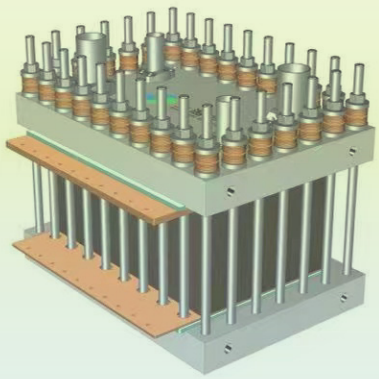
Specification	Unit	ALK
H_2 Nominal Production Rate	Nm^3/h	100～3000
Current Density	A/m^2	2500~10000
Electrolyzer Operating Temperature	℃	90±5
DC Power Consumption	kWh/Nm^3H_2	≤4.0
System Power Consumption	kWh/Nm^3H_2	≤4.6
Operating Pressure	MPa	1.6
Load Range	%	30~150
Pure water consumption	L/Nm^3	≤1
H_2 Purity	%	≥99.9995
Cold start time	min	~30
Response time	%/s	±1.5
Design service life	year	≥20

Highly efficient, flexible, modular PEM electrolyzer and its system

Suitable for Distributed And Flexible Hydrogen Production Scenario

2-400Nm³/h

"N–to–1" with
PEM Electrolyzer System



High Efficiency

hydrogen production efficiency reach up to **80%**

DC power consumption **<4.1 kWh/Nm³ H_2**

Hydrogen purity **>99.9995%**

Flexibility

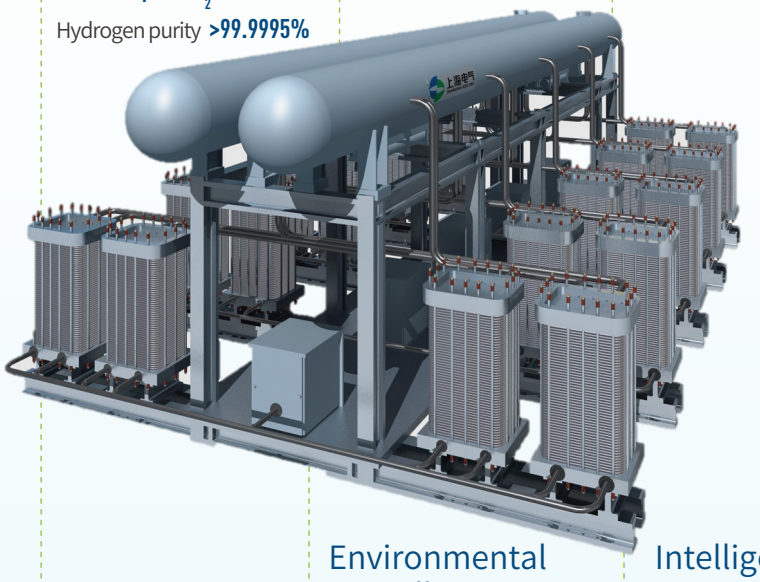
Dynamic Load **5-150%**

Response Speed **±10%/s**

Modularization

"N to 1" Design Concept

Client-tailored service model



Safety

Triple Protection

Improved system security

Environmental Friendly

Hydrogen Production by Renewable energy

No Pollution and zero-carbon emissions throughout operation

Intelligent

Digital design

Digital twin technology

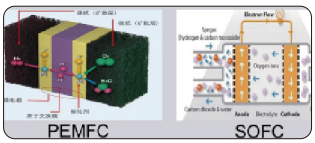
One-button start / stop and unattended operation

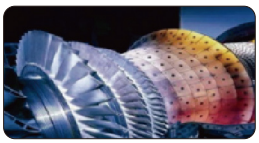
Specification	Unit	PEM
H_2 Nominal Production Rate	Nm^3/h	2～400
Current Density	A/m^2	15000
Electrolyzer Operating Temperature	℃	60±5
DC Power Consumption	kWh/Nm^3	≤4.1
System Power Consumption	kWh/Nm^3	≤4.7
Operating Pressure	MPa.G	3.0
Load Range	%	5~150
Pure water consumption	L/Nm^3	≤1
H_2 Purity	%	≥99.9995
Cold start time	min	≤2
Response time	%/s	±10
Design service life	year	≥10

Shanghai Electric's Hydrogen Energy Industry Layout

The development of hydrogen energy is one of the vital means in achieving "carbon neutrality" and a strong support for responding to national policies in new energy system development. Using its accumulated experience and advantages in energy equipment manufacturing and chemical engineering, Shanghai Electric can provide a full range of core and auxiliary hydrogen energy equipment, including hydrogen production, storage, refueling, and utilization. Including alkaline hydrogen production units (ALK), proton exchange membrane hydrogen production units (PEM), hydrogen storage devices, diaphragm compressors, fuel cells, hydrogen-blending power generation equipment, and other mature, reliable equipment. Shanghai Electric is competent to offer variable comprehensive solutions for customers such as "renewable power generation + electrolysis hydrogen production + green chemical industry / integrated stations for hydrogen production, storage, and refueling/hydrogen energy storage."

Application



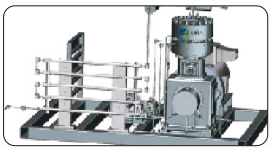


Power Generation

Chemical Industry

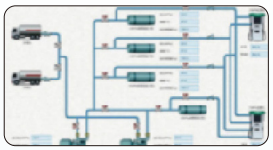
Transportation

Refueling



Compressor

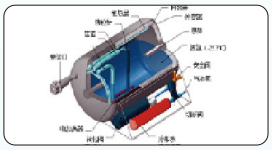
Hydrogen refuel station



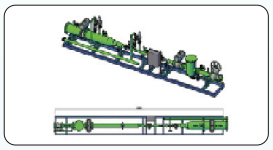
Refueling Control

Storage and Transportation

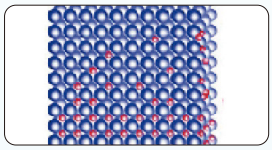
Gas



Liquid



Pipe

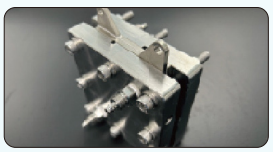


Solid

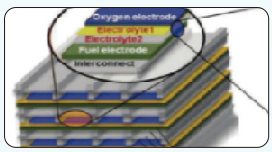
Green Hydrogen Production

Alkaline Electrolytic Electrolysis

Proton Exchange Membrane Electrolysis



Anion Exchange Membrane Electrolysis



Solid Oxide Electrolytic Electrolysis

Power Supply

Coal

Nuclear

Gas

Concentrated solar

Wind

Photovoltaic

Biomass

Electrolysis Water Technology R&D Center

Electrolyzer Comprehensive Testing and Certification Center

Project Reference

Shanghai Electric focuses on the R&D and manufacturing of core hydrogen production, storage, refueling, and utilization equipment, leading the industry with cutting-edge technology. We provide "Green Hydrogen+" comprehensive solutions and EPC contracting services to meet users' demands in fields such as the green chemical industry, green transportation, industrial parks, large-scale wind/solar power bases, and other sectors.

Green Chemical

Wind Power Coupled with Biomass to Green Methanol Integration Demonstration Project in Taonan City

Shanghai Electric’ s first green hydrogen coupled biomass gasification for green methanol production project
Project configuration: 67.2MW Wind power + 8,000Nm³/h Alkaline electrolysis hydrogen production + 200Nm³/h PEM electrolysis hydrogen production + Biomass gasification Methanol Synthesis (initial phase with capacity of 50,000 tons per year)

Green Transportation

Fishery and Photovoltaic Hybrid Coupled Hydrogen Project in Jiaozhou City

Typical application case of Shanghai Electric's solution of integrated hydrogen production, storage, and refueling station hydrogen for transportation field
Project configuration: 120MW photovoltaic power +4000Nm³/h alkaline electrolysis hydrogen production + 4000Nm³ solid hydrogen storage +4000Nm³ gaseous hydrogen storage + 1400kg/d hydrogen refueling station

Industrial park

Shanghai Electric Green Hydrogen Production–Storage–Utilization Integrated Demonstration Project

The first power source-grid-load-storage-hydrogen integration demonstration project for industrial park in China
Project Configuration: 2.2MW photovoltaic power+10kW wind power_4.02MW/12.6MWh LFP battery+70kW/307.2kWh recycled cascading utilization of power battery+300Nm³/h PEM electrolysis hydrogen generation+4m³ hydrogen storage+30kW fuel cell power generation.

上海电气
SHANGHAI ELECTRIC

Mission

Empower Global Industry, Make Life Smarter

Vision

To be a world-class manufacturer leading in industrial development

Core Values

Commitment to Excellence, Empowerment with Innovation
Win-Win Cooperation, and Customer Success

Brand Position

Supplier of industrial-grade eco-friendly smart system solutions

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