零碳能源
ZERO CARBON ENERGY

氢能产业在中国的发展及燃料电池在中国及贵州的应用

Development of Hydrogen Energy Industry in China and Application in Guizhou Province

氢能效率
Hydrogen Energy Efficiency

德国科隆 H2 氢能源网络大会
Kölnisch H2 - Neues aus der Wasserstoffregion

2022年9月29日

Company Introduction

Guizhou Hydrogen Energy Efficiency Technologies Co., Ltd. is a hydrogen energy industry application solution service provider and a fixed proton exchange membrane fuel cell equipment manufacturing enterprise jointly established by Guizhou Maritime Silk Road International Investment Corporation, HEE Technologies GmbH, Germany, Guizhou Gas Group Co., LTD., Guizhou Changtong Group and other enterprises. The main business is:

- **R&D and production of hydrogen energy core products**
  1. **Fixed proton exchange membrane fuel cell system**
- **Hydrogen energy application solutions**
  1. **Application technology of hydrogen-electric coupling and energy coupling**

Shareholders:

GIIC
贵州海上丝路国际投资有限公司
Guizhou Maritime Silk Road International Investment Corporation

Hydrogen Energy Era

贵州燃气集团股份有限公司
Guizhou Gas Group Corporation Ltd.

经开产投集团
EDZ INDUSTRIAL INVESTMENT GROUP

长通集团

HYDROGEN
贵州环域氢能科技中心
（有限合伙）
Guizhou Huanyu Hydrogen Energy Technology Center (Limited Partnership)

CONTENT

- General development of China's hydrogen energy industry
- Major applications of hydrogen fuel cells in China and Guizhou province

The General Development of China's Hydrogen Energy Industry

General Development of China's Hydrogen Energy Industry

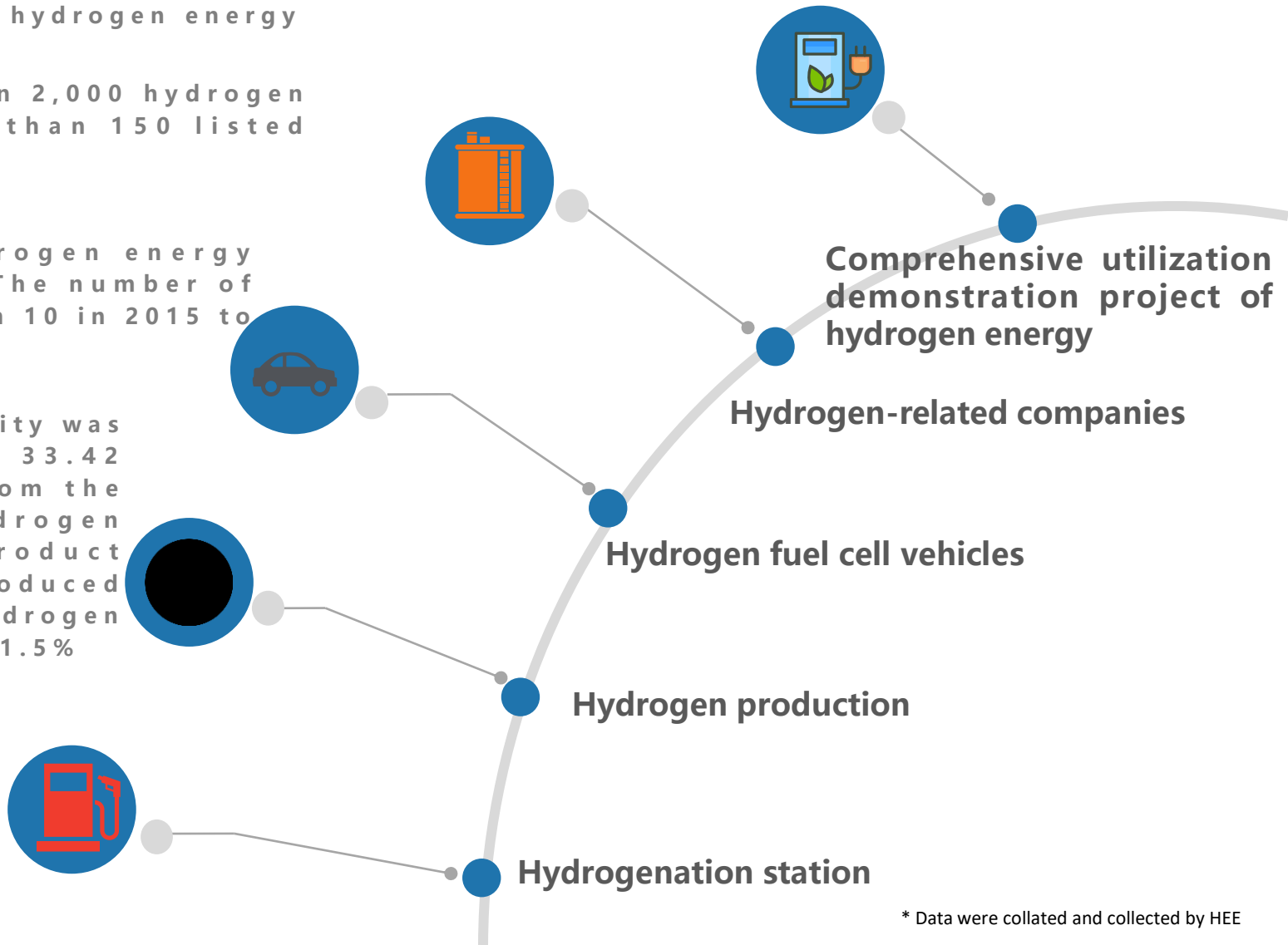
By the end of 2021, China already had 11 major demonstration projects for the comprehensive utilization of hydrogen energy

By the end of 2021, China had more than 2,000 hydrogen energy-related companies and more than 150 listed hydrogen-related companies.

From 2015 to 2021, the number of hydrogen energy vehicles in China continued to increase. The number of fuel cell vehicles in China will increase from 10 in 2015 to 8938 by the end of 2021

In 2021, China's hydrogen production capacity was 41 million tons/year, with an output of 33.42 million tons. The source was different from the global structure. The proportion of hydrogen produced from coal was 63%, the by-product hydrogen was about 22%, the hydrogen produced from natural gas was about 14%, and the hydrogen produced from electrolytic water was about 1.5%

In 2021,218 hydrogenation stations have been built in China, with an increase of 100 more than the previous year. It is estimated that 287 hydrogen refueling stations will be built in 2022



* Data were collated and collected by HEE

Related Policies for the development of China's Hydrogen energy industry in 2019-2021

In 2019, The State Council of China included the development of hydrogen energy-related industries into the Government Work Report for the first time, and then the Chinese government issued a series of policies in terms of strategy, industrial structure, science and technology and finance to guide and encourage the development of the hydrogen energy industry

Policy	Time	Subject	Main content and function
The Energy Work Guidelines for 2021	2021/4	National Energy Administration	1) Carry out pilot standards of hydrogen energy industry, explore a variety of technology development routes and application paths; 2) In combination with emerging fields such as hydrogen energy, energy storage and integrated development of digitalization and energy, as well as important fields urgently needed for industrial development, several innovation platforms will be added
Opinions on Accelerating the Establishment of a Green Production and Consumption Law and Policy System	2021/3	National Development and Reform Commission, and Ministry of Justice	Increase policy support for distributed energy, smart grid, energy storage technology and multi energy complementation, and study and formulate standards, specifications and support policies for new energy development such as hydrogen energy and ocean energy.
The Fourteenth Five Year Plan and the Outline of the Vision and Objectives for 2035	2021/3	Central Committee of the Communist Party of China	It is necessary to plan the future industry in a forward-looking way, organize and implement the future industrial incubation and acceleration plan in frontier science and technology and industrial reform fields such as hydrogen energy and energy storage, and plan and layout a number of future industries.
White Paper on China's Energy Development in the New Era	2020/12	the State Council	From 2030 to 2035, large-scale application of hydrogen energy and fuel cell vehicles will be realized, and the number of fuel cell vehicles will reach about 1 million. By 2025, the construction target of China's hydrogen refueling stations is at least 1000, and the cost of hydrogen fuel will fall to 40 yuan/kg; By 2035, at least 5000 hydrogen refueling stations will be built, and the cost of hydrogen fuel will fall to 25 yuan/kg
The Development Plan for the New Energy Vehicle Industry (2021-2035)	2020/10	Public Office of The State Council	1) To overcome the application and support technology of hydrogen fuel cell vehicle, such as hydrogen energy storage and transportation, hydrogen refueling station and vehicle hub hydrogen storage. 2) Improve the economy of hydrogen fuel production, storage and transportation, and carry out the application of industrial byhydrogen and renewable energy hydrogen production technology according to local conditions. 3) Carry out the demonstration and application of various forms of storage and transportation technologies to gradually reduce the cost of hydrogen fuel storage and transportation. We will improve the standard system for hydrogen fuel production, storage, transportation, and refueling
The Government Work Report for 2020"	2020/5	the State Council	Increase investment in basic hydrogen fuel cell scientific research, break through the technical bottleneck of core materials and key components, and promote product localization; encourage and promote local hydrogen energy demonstration and application according to local conditions to promote the formation of large-scale industrial clusters, guide social capital investment through policies, and encourage energy enterprises to lead the establishment of a stable, convenient and low-cost hydrogen supply system.
Outline of Building a Transportation Powerful Country	2019/09	the State Council	It is necessary to scientifically plan and build urban parking facilities, strengthen the construction of charging, hydrogen refueling, bus stops and other facilities, and comprehensively improve the intelligent level of urban transport infrastructure.
A Government Work Report	2019/03	the State Council	Automobile consumption should be stablized, continue to implement preferential policies for the purchase of new energy vehicles, and promote infrastructure construction such as charging and hydrogenation.

Source: The official websites of the Chinese government departments

National Medium and Long-term Plan for Hydrogen Energy Industry Development

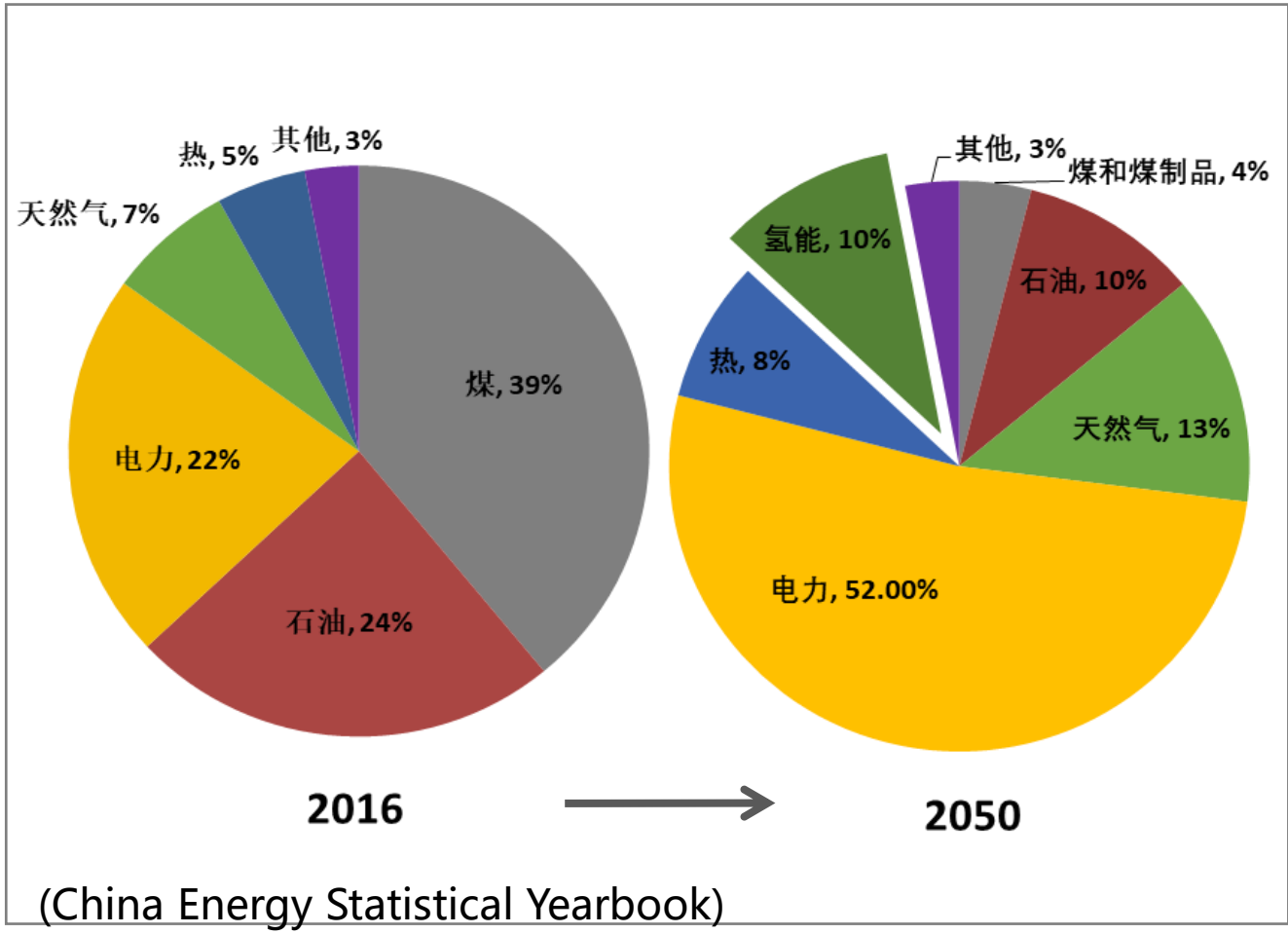
The Medium and long-term Plan for Hydrogen Energy Industry Development (2021-2035) pointed out:

- By 2025, hydrogen production from renewable energy will reach 100,000 to 200,000 tons/year, becoming an important part of new hydrogen energy consumption;
- By 2030, a relatively complete clean energy hydrogen production and supply system will be formed, and renewable energy hydrogen production will be widely used;
- By 2035, the proportion of hydrogen production from renewable energy in terminal energy consumption will increase significantly, which will play an important role in supporting the green transformation and development of energy

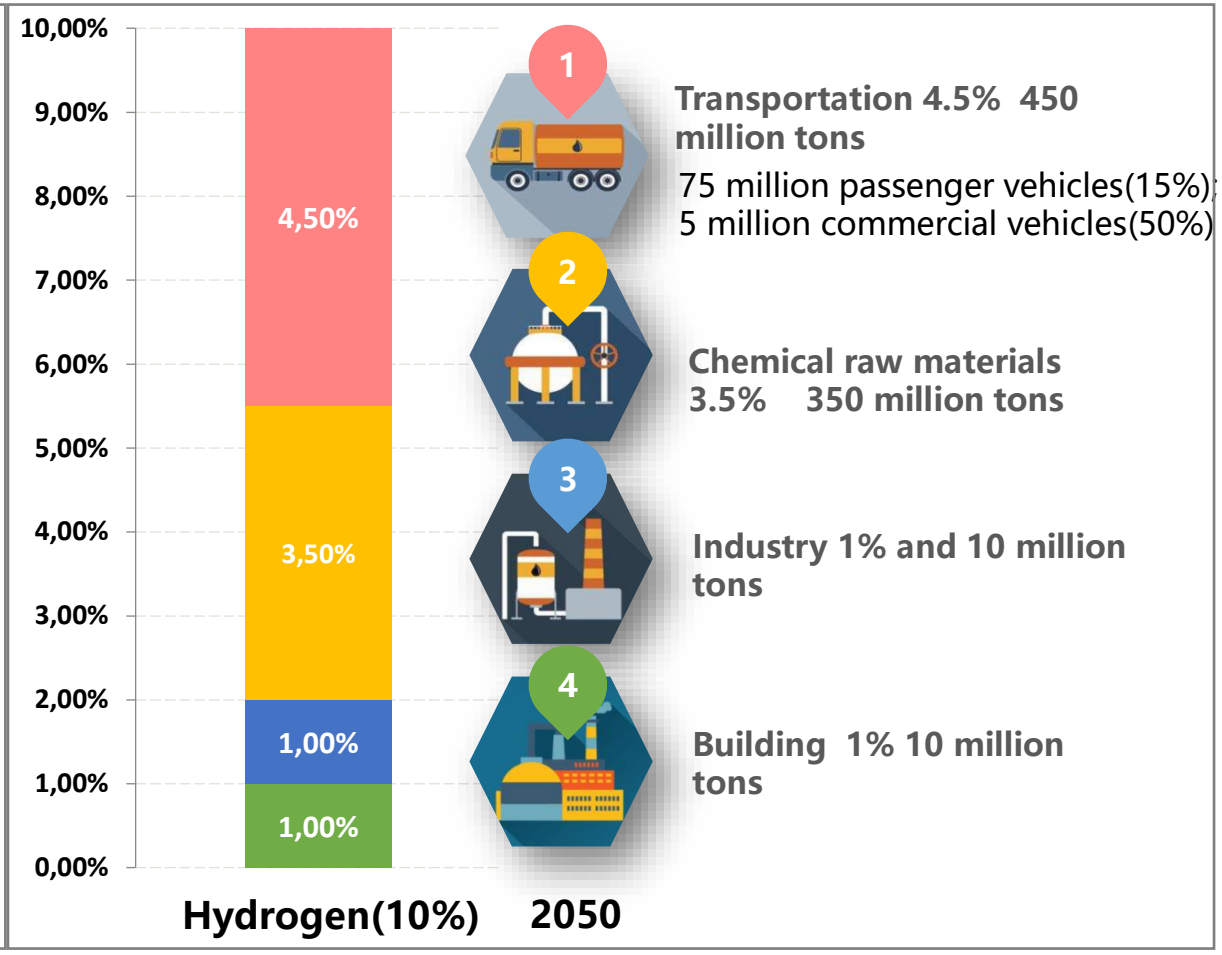
According to the forecast of the China Hydroge Alliance:

- Under the scenario of carbon peak in 2030, the annual demand for hydrogen in China will reach 37.15 million tons, accounting for about 5% of the demand for terminal energy consumption. By 2050, the demand for hydrogen will reach 96.9 million tons, with a compound annual growth rate of 4.9% from 2030 to 2050.
- Under the carbon neutral scenario in 2060, the annual demand for hydrogen in China will increase to about 130 million tons, accounting for about 20% of the final energy consumption, and the compound annual growth rate of hydrogen demand from 2030 to 2060 will be 4.3%.

The Position of Hydrogen in China's Energy System
Introduction about Hydrogen Industry

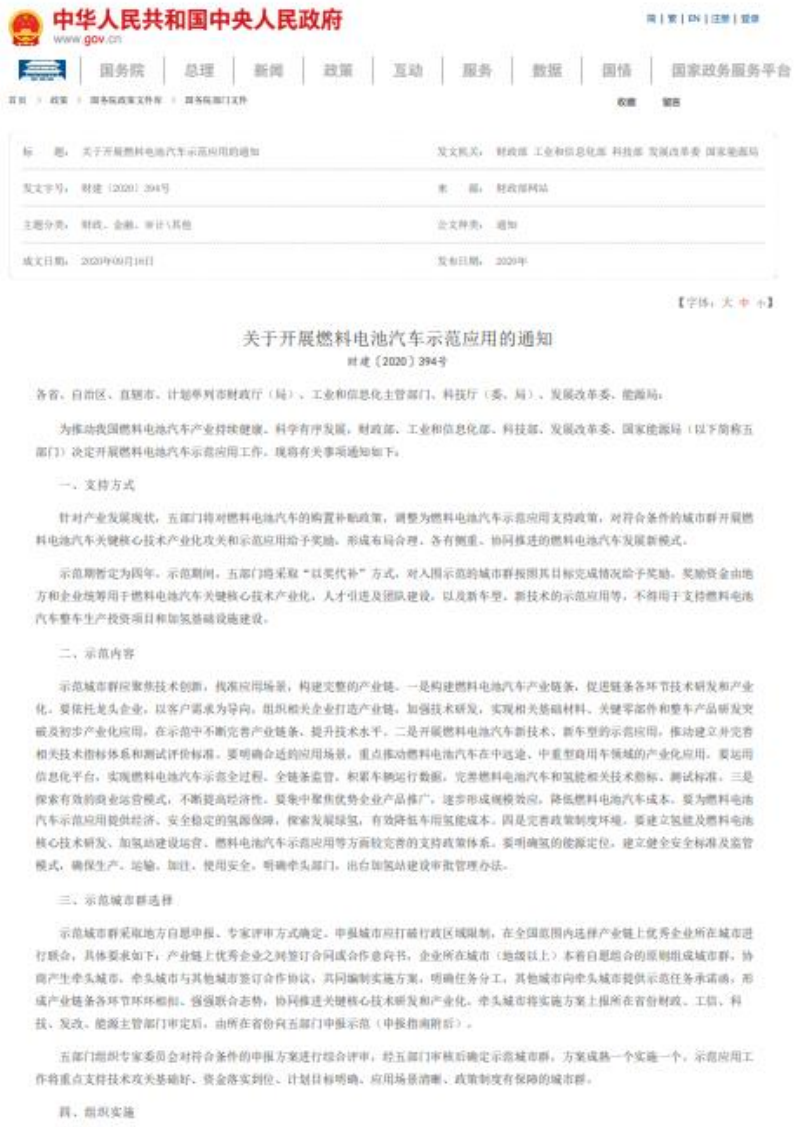


(China Energy Statistical Yearbook)



It is conservatively estimated that hydrogen will account for 10% of China's terminal energy system in the future and become an important part of China's energy strategy. Hydrogen energy will be incorporated into China's terminal energy system, and will be complementary with electric power to become the main consumer of China's terminal energy system

Promote the Development of Hydrogen Energy Industry with Hydrogen Fuel Cell Vehicle Demonstration Cities



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关于开展燃料电池汽车示范应用的通知

财建〔2020〕394号

各省、自治区、直辖市、计划单列市财政厅（局）、工业和信息化主管部门、科技厅（委、局）、发展改革委、能源局：

为推动我国燃料电池汽车产业持续健康、科学有序发展，财政部、工业和信息化部、科技部、发展改革委、国家能源局（以下简称五部门）决定开展燃料电池汽车示范应用工作，现将有关事项通知如下。

一、支持方式

针对产业发展现状，五部门将对燃料电池汽车的购置补贴政策，调整为燃料电池汽车示范应用支持政策，对符合条件的城市群开展燃料电池汽车关键核心技术产业化攻关和示范应用给予奖励，形成布局合理、各有侧重、协同推进的燃料电池汽车发展新模式。

示范期暂定为四年，示范期间，五部门将采取“以奖代补”方式，对入围示范的城市群按照其目标完成情况给予奖励，奖励资金由地方和企业统筹用于燃料电池汽车关键核心技术产业化，人才引进及团队建设，以及新车型、新技术的示范应用等，不得用于支持燃料电池汽车整车生产投资项目和加氢基础设施建设。

二、示范内容

示范城市群应聚焦技术创新，找准应用场景，构建完整的产业链。一是构建燃料电池汽车产业链条，促进链条各环节技术研发和产业化，要依托龙头企业，以客户需求为导向，组织相关企业打造产业链，加强技术研发，实现相关基础材料、关键零部件和整车产品研发突破及初步产业化应用，在示范中不断完善产业链条，提升技术水平。二是开展燃料电池汽车新技术、新车型的示范应用，推动建立并完善相关技术指标体系和测试评价标准，要明确合适的应用场景，重点推动燃料电池汽车在中远途、中重型商用车领域的产业化应用。要运用信息化平台，实现燃料电池汽车示范全过程、全链条监管，积累车辆运行数据，完善燃料电池汽车和氢能相关技术指标、测试标准。三是探索有效的商业运营模式，不断提高经济性。要集中聚焦优势企业产品推广，逐步形成规模效应，降低燃料电池汽车成本。要为燃料电池汽车示范应用提供经济、安全稳定的氢源保障，探索发展绿氢，有效降低车用氢能成本。四是完善政策制度环境，要建立氢能及燃料电池核心技术研发、加氢站建设运营、燃料电池汽车示范应用等方面较完善的支持政策体系。要明确氢的能源定位，建立健全安全标准及监管模式，确保生产、运输、加注、使用安全，明确牵头部门，出台加氢站建设审批管理办法。

三、示范城市群选择

示范城市群采取地方自愿申报、专家评审方式确定。申报城市应打破行政区域限制，在全国范围内选择产业链上优秀企业所在城市进行联合，具体要求如下：产业链上优秀企业之间签订合同或合作意向书，企业所在城市（地级以上）本着自愿组合的原则组成城市群，协商产生牵头城市，牵头城市与其他城市签订合作协议，共同编制实施方案，明确任务分工，其他城市向牵头城市提供示范任务承诺函，形成产业链条各环节环环相扣、强强联合态势，协同推进关键核心技术研发和产业化。牵头城市将实施方案上报所在省份财政、工信、科技、发改、能源主管部门审定后，由所在省份向五部门申报示范（申报指南附后）。

五部门组织专家委员会对符合条件的申报方案进行综合评审，经五部门审核后确定示范城市群，方案成熟一个实施一个。示范应用工作将重点支持技术攻关基础好、资金落实到位、计划目标明确、应用场景清晰、政策制度有保障的城市群。

四、组织实施

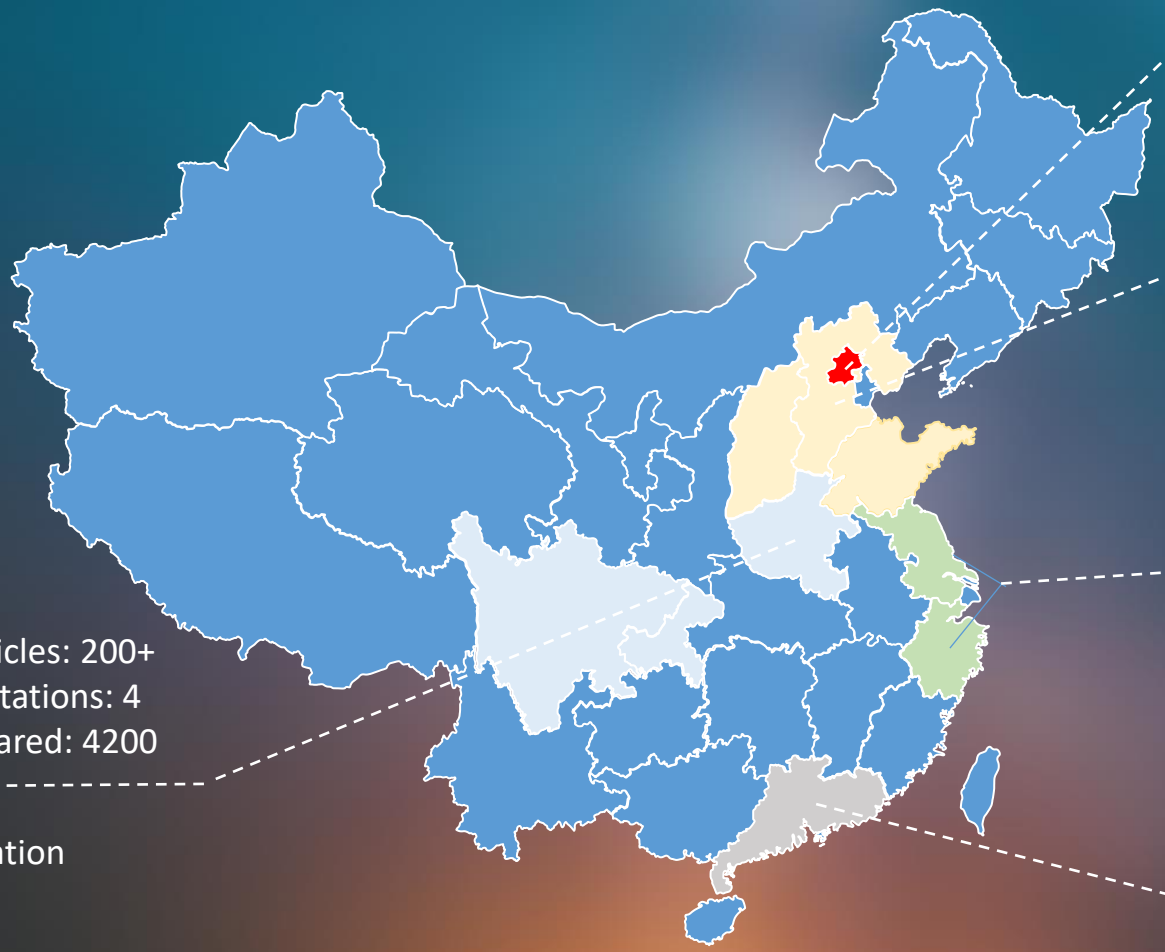
In September 2020, the Ministry of Finance, the Ministry of Industry and Information Technology, the Ministry of Science and Technology, the National Development and Reform Commission and the National Energy Administration issued the Notice on the Demonstration Application of Fuel Cell Vehicles to carry out the demonstration application of fuel cell vehicles.

During the demonstration period, the five departments will adopt the method of "replacing subsidies with awards" to reward the city clusters that are shortlisted for demonstration according to their goal completion. The incentive funds shall be used by local governments and enterprises for the industrialization of key core technologies of fuel cell vehicles, talent introduction and team building, as well as the demonstration application of new models and new technologies, and shall not be used to support the investment projects of fuel cell vehicle production and the construction of hydrogen refueling infrastructure.

5 urban agglomerations:

- Daxing District is the leading city to form Beijing, Tianjin and Hebei hydrogen fuel cell vehicle demonstration city cluster.
- Shanghai, together with six cities (regions) including Jiangsu Province and Ningxia, has jointly formed the "1+6" Shanghai Urban Agglomeration.
- Led by Foshan, Guangzhou and other cities, Guangdong city cluster will be established to demonstrate the application of fuel cell vehicles.
- Hebei fuel cell vehicle demonstration city cluster includes 14 cities.
- Zhengzhou fuel cell vehicle application demonstration city cluster includes 11 cities with industrial chain advantages.

Hydrogen transportation



Beijing Urban Agglomeration

Currently promoted vehicles: 200+
Existing hydrogenation stations: 2
Number of vehicles declared: 4000

Hebei Urban Agglomeration

Currently promoted vehicles: 178
Existing hydrogenation stations: 2
Number of vehicles declared: 6000

Shanghai Urban Agglomeration

Currently promoted vehicles: 2000+
Existing hydrogenation stations: 9
Number of vehicles declared: 10000

Currently promoted vehicles: 200+
Existing hydrogenation stations: 4
Number of vehicles declared: 4200

Henan Urban Agglomeration

Guangdong Urban Agglomeration

Currently promoted vehicles: 2000+
Existing hydrogenation stations: 28
Number of vehicles declared: 5000

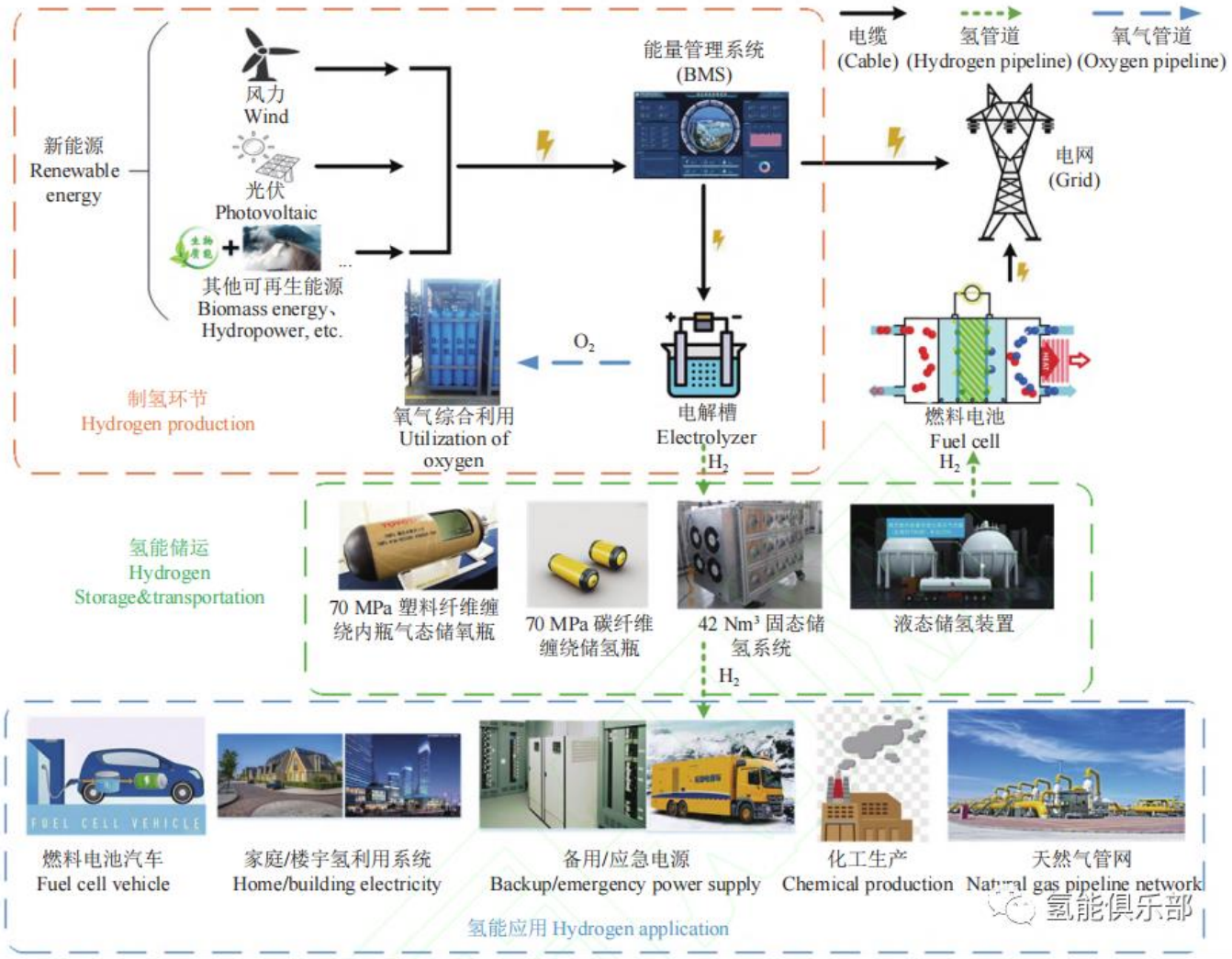
Taking Shandong Province as an Example —— Hydrogen Energy Has Become an Important Link of Comprehensive Energy Application

氢能效率 Hydrogen Energy Efficiency

Shandong Province and the Ministry of Science and Technology implement "hydrogen into thousands of households"

Name of Subject	Integration of key technologies of hydrogen power and energy supply and application of typical scenarios in high-speed, port and park (demonstration application)	
Hydrogen energy dynamic system adapted to multiple scenarios	Mainly for vehicles	
Highway zero-hydrocarbon service area	quantity	≥2
	Hydrogen energy source	renewable energy
	Hydrogen power supply	The power generation efficiency is not less than 50%
	Vehicle filling	Daily≥500kg，with 70MPa capability
	Ability to connect to nearby hydrogen supply pipelines and connect to hydrogen energy supply vehicles	
Low hydrocarbon industrial Park	quantity	≥2
	Hydrogen energy source	Byproduct of hydrogen / renewable energy / low-carbon feedstock
	Hydrogen power supply	Supply of power rail crane≥10 Other electrical load≥300kW The power generation efficiency is not less than 50%
	Vehicle filling	Daily≥1,000 k g, with 70MPa capability
	Ability to connect to nearby hydrogen supply pipelines and connect to hydrogen energy supply vehicles	
Low hydrocarbon industrial Park	quantity	≥1
	Hydrogen energy source	By-product of hydrogen≥5 tons/day
		Hydrogen production by PEM and AEM electrolytic systems shall not be less than 100Nm^3/ hour
	Total amount of hydrogen	≥10T/day (fixed and vehicle)
	Hydrogen energy supply	The office area of fuel cell heating and electric enterprises covering a construction area of more than 5000m^2
	Supporting pure hydrogen supply pipeline shall be no less than 3km, connecting nearby hydrogen supply pipeline and hydrogen supply vehiclesability.	
Hydrogen expressway	Mainly for vehicles	

New power system



The new power system puts forward higher requirements for new energy consumption, grid regulation, and stable system operation. In the future, hydrogen energy will be used in all aspects of the source, the grid and the load.

On the power side/gas source side, industrial by-product gas purification or new energy local hydrogen production, traditional power supply coupling with hydrogen energy will promote efficient new energy consumption and utilization, balance new energy power output power fluctuation, improve new energy grid friendliness, and support large-scale new energy power transmission. At the same time, traditional coal power coupling new energy and hydrogen energy will enhance the flexibility and clean and low-carbon level of coal power, and promote the green and sustainable development of coal power.

On the grid side, hydrogen energy storage plants can be reasonably laid out at key grid nodes such as large-scale new energy convergence, intensive load access and difficult peak and frequency regulation, which can play the role of peak regulation, frequency regulation, voltage regulation and slope climbing, and improve the safety, reliability and flexibility of power system.

On the load side, hydrogen cogeneration and distributed electric hydrogen refueling stations can participate in grid auxiliary services and support the construction of distributed energy supply systems, so as to bring into play the coupling and complementary effects of different energy systems such as electricity, gas, heat, cold and hydrogen, promote the development of comprehensive energy services and enhance the terminal energy efficiency and comprehensive energy supply reliability.

Hydrogen Fuel Cells Applications in Guizhou Province

Guizhou Province hydrogen energy industry development plan

贵州省发展和改革委员会文件

黔发改能源〔2020〕826号

省发展改革委关于印发《贵州省氢能产业发展规划编制工作专班暨编制工作方案》的通知

各有关单位：

《贵州省“十四五”氢能产业发展规划》已列入省“十四五”重点专项规划。按照省政府安排部署，由省发展改革委、省工业和信息化厅、省科学技术厅、省能源局会同相关单位组织开展规划编制工作，组建重点专项规划编制专班，制定重点专项规划编制工作方案。经征集相关单位意见，形成《贵州省氢能产业发展规划编制工作专班暨编制工作方案》，现印发。

附件：贵州省氢能产业发展规划编制工作专班暨编制工作方案

贵州省发展和改革委员会

2020年8月27日

Guizhou Province "Fourteenth Five-Year Plan" Hydrogen Energy Development Plan will be issued soon

The spatial layout of hydrogen energy in Guizhou Province in the 14th Five-Year Plan is to combine the resource endowment and industrial foundation of each city (state), highlight the advantageous cluster areas, and build "one axis, one belt and three lines" as the core zone of hydrogen energy industry development, namely "Guiyang-Ansun-Lupanshui" hydrogen energy industry development core axis, "Bijie-Lupanshui-Xingyi" hydrogen energy industry circular economic belt, and three "red tourism-green hydrogen road" hydrogen energy application demonstration special lines. Relying on the leading role of "one axis, one belt and three lines", the core zone of hydrogen energy industry development will drive other regions to create a whole industry chain of hydrogen energy with Guizhou characteristics according to local conditions.

Guizhou Provincial Energy Bureau Commissioned HEE to Implement the Hydrogen Energy Practice and Application Plan in Guizhou Province

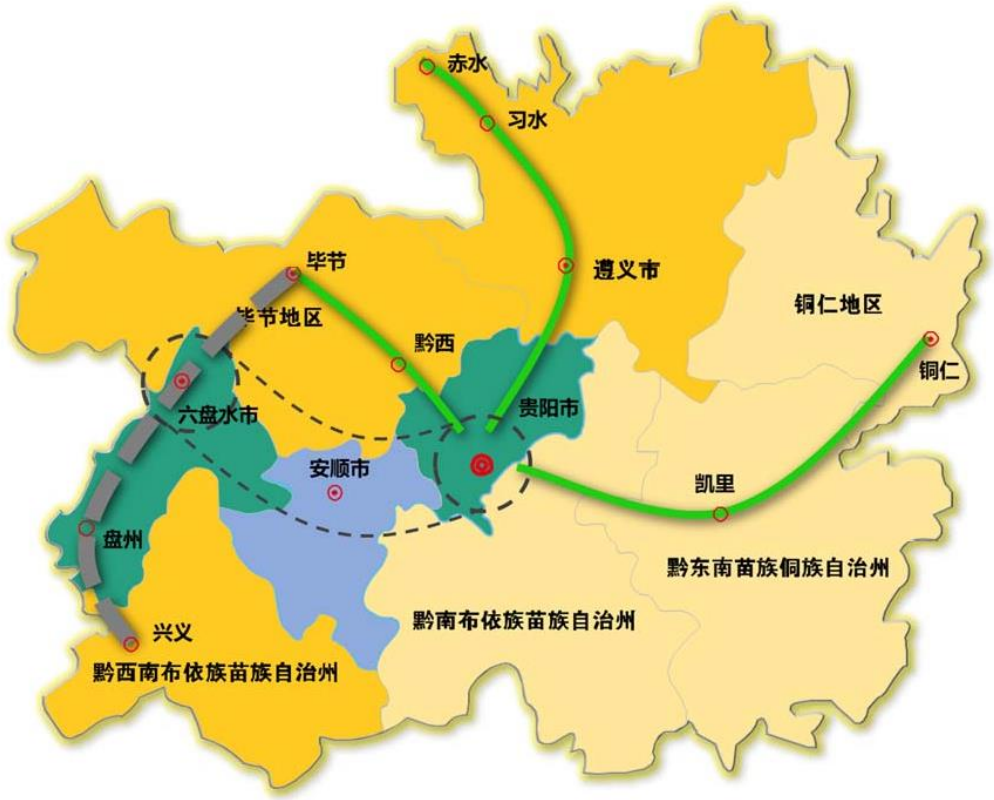
Hydrogen Energy Industry Development Plan

贵州省氢能实践及应用研究

报价单位：贵州氢能效率能源科技有限公司

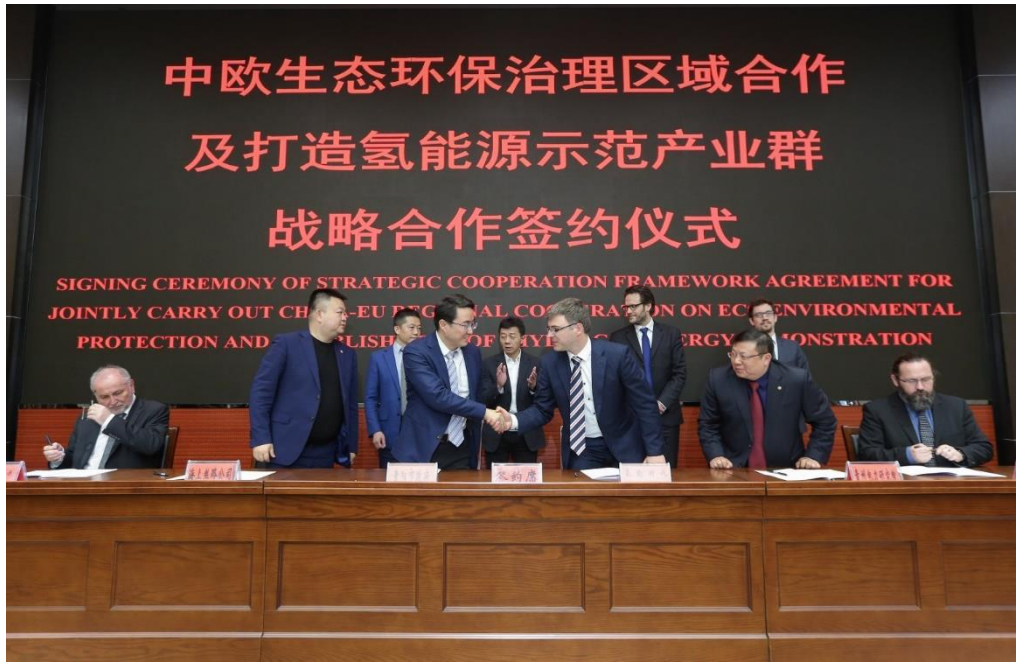
地　　址：贵州省高新区都匀路 30 号

2022 年 03 月 22 日



Sino-European Regional Cooperation on Ecological and Environmental Protection Governance Initiated by Chinese and German Enterprises and Building a Gydrogen Energy Demonstration Industry Cluster

- In March 2019, Guiyang Municipal People's Government signed a strategic cooperation framework agreement with Guizhou Maritime Silk Road International Investment Co., Ltd., HEE Technologies GmbH and other technology partners to jointly carry out Sino-EU regional cooperation in ecological and environmental protection governance and build a hydrogen energy demonstration industrial group.
- Integrate ecological and environmental protection governance and hydrogen energy system solutions, technology research, market application, equipment manufacturing and other advantageous resources, and build a hydrogen energy industrial cluster with Guiyang as the hydrogen production, hydrogen storage, hydrogen energy application, related industrial research and development and manufacturing base.
- In August 2019, Guiyang city designated the 65 square kilometers area of Xiaomeng Ecological Industrial Park to build a —— Guiyang (EDZ) hydrogen energy industrial cluster area. With this as the carrier, combined with the international hydrogen energy development experience, to create a comprehensive application of hydrogen energy, gather the hydrogen energy industry, and form an industrial closed-loop.



Regional Hydrogen Energy Development Conditions Compare with Other Areas

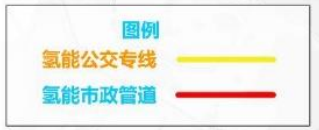
Technology	Raw Material	Possible Amount of Hydrogen Gas Produced
Industrial by-products	Jiao Gas (Liupanshui), Chemical Plant (Fuquan, Kaiyang, Tongzi)	75,000 tons / year Liupanshui and Guiyang
Biomass resources for hydrogen production	Forest farm waste residue, smoke slag, sludge	1.8 million tons / year Guizhou
Renewable energy sources and valley electrolysis for hydrogen production		Xiaomeng Industrial Park is included in the demonstration project category of Guiyang Power Supply Bureau; Datang and Huaneng can all start the record of renewable energy hydrogen production projects in Guizhou Province
coal chemical industry	The gasification process of coal produces hydrogen gas	19,000 tons / year Guiyang
Renewable energy installed capacity	Installed capacity will account for more than 58%	

Projects related to hydrogen energy industry cluster area that have been carried out in Guiyang

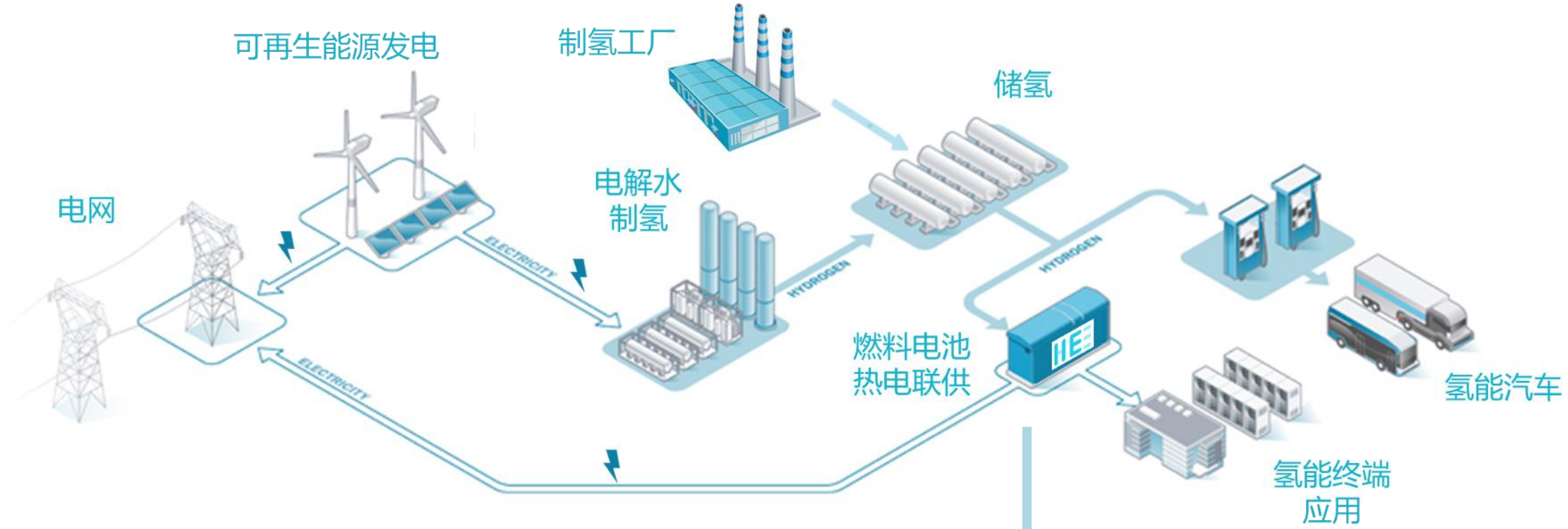
Guiyang (EDZ) hydrogen energy industry cluster area of 65 square kilometers of demonstration project planning and construction

Construction content project:

- Two comprehensive energy service stations related to hydrogen energy;
- 6MW, biomass and organic solid waste resource utilization for hydrogen production;
- 5MW electrolytic hydrogen production station;
- Special 13 km hydrogen transmission pipeline;
- Multi-point utilization of fuel cell combined heat and electric supply system;
- Fuel cell public transport system construction.



From the new energy system to replicable patterns

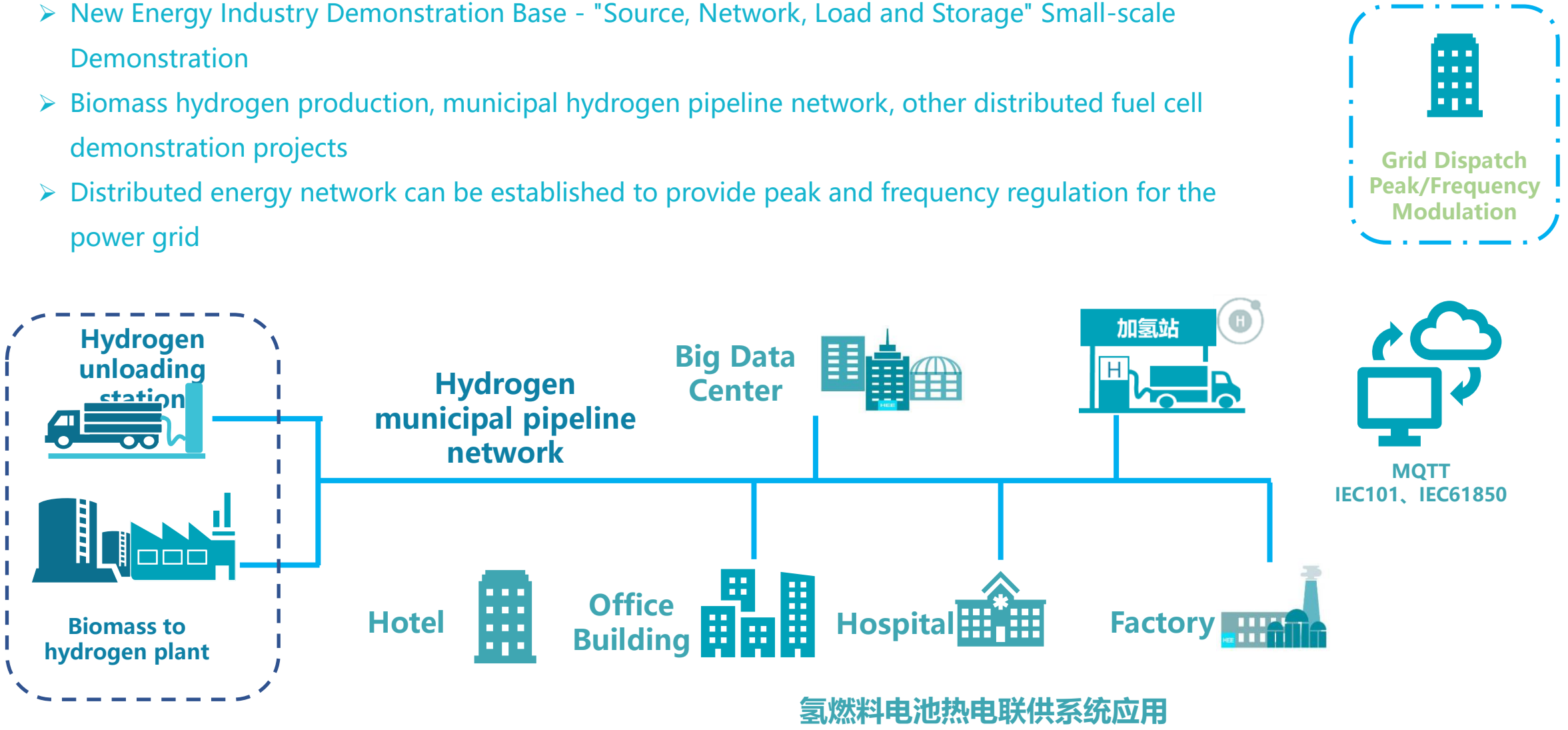


Model: Through the way of "technology" + "capital", we will build a new energy system consisting of hydrogen energy and a demonstration base for carbon reduction and control. By creating an industrial combination of environmental protection + new energy, it brings "industry chain extension" + "capital" + "industrial landing" to the local area.

Step1： Chemical exhaust treatment + hydrogen energy scale local consumption
Step2： Chemical exhaust gas treatment + green power hydrogen production + hydrogen energy scale multi-path comprehensive utilization

Smart Microgrid + Integrated Energy Cogeneration

- New Energy Industry Demonstration Base - "Source, Network, Load and Storage" Small-scale Demonstration
- Biomass hydrogen production, municipal hydrogen pipeline network, other distributed fuel cell demonstration projects
- Distributed energy network can be established to provide peak and frequency regulation for the power grid



Projects related to hydrogen energy industry cluster area that have been carried out in Guiyang

Guizhou's first hydrogen power

comprehensive energy service station

Huaguan Integrated Energy Service Station

Comprehensive Application of Demonstration —— to Start Hydrogen Transportation (Public Transportation, Logistics, etc.)

Liupanshui Hydrogen Energy Industry Planning Release and Hydrogen Energy Demonstration Project Construction

In September 2019, Liupanshui issued the "Liupanshui City Hydrogen Energy Industry Development Plan (2019-2030)"

- **Liupanshui City Hydrogen Energy Industry Development Plan (2019-2030) was released in September 2019**

Build the infrastructure of liquid hydrogen plants and hydrogen refueling stations, recycle the hydrogen in coke oven gas, **realize the local extraction and absorption of cheap hydrogen,** form a hydrogen energy industry chain of hydrogen production (hydrogen source), hydrogen storage, transportation and utilization, **cultivate a number of influential hydrogen energy enterprises of hydrogen production, storage, transportation and equipment, and high-value conversion**, gather a number of research and development centers, testing and certification centers, and demonstrate and drive the development of our hydrogen energy industry.

Liupanshui Hydrogen Energy Industry Planning Release and Hydrogen Energy Demonstration Project Construction

Project Name	Location	Scale (million tons/year)	Coke Oven Gas Quantity (billions cube meters/year)	Hydrogen (billions cube meters/year)	Use Coke Oven Gas	Project Schedule
Xin Guang Coking	Baiguo Town, Panzhou City	2	0.4	0.22	LNG production, surplus nitrogen and hydrogen exhaust gas combustion power generation (about 80 million cubic meters of hydrogen)	Has been built
Xin Guang Coking	Dashan Town, Panzhou City	1.2	0.24	0.132	Send it to Pingnan power plant for power generation and utilization	Has been built
Shougang	Zhongshan District Moon Industrial Park	1	0.2	0.11	For the enterprise-owned power plant power generation and utilization	Has been built
Xin Guang Coking	Dashan Town, Panzhou City	0.45	0.09	0.05	Supply of glass fiber plants for use as fuel	Has been built
Xin Guang Coking	Dashan Town, Panzhou City	2	0.4	0.22	Planning and utilization for power generation or pipeline transmission as industrial fuel	under construction
Qi Li New Energy	Jianshan Street, Shuicheng District	2.4 (Construction in two phases)	0.48	0.264	120,000 tons of LNG and 150,000 tons of methanol	under construction
Shougang	Zhongshan District Moon Industrial Park	3.2 (Replace the original 1 million ton capacity and construct in two phases)	0.64	0.352	Combustion produces steam and uses steam to generate electricity	Proposed construction
Hongyuan New energy	Panzhou City, Jichang Ping Town	3.2	0.64	0.352	150,000 tons / year methanol and 50,000 tons / year liquid ammonia	Proposed construction
Zhongqing Coal Chemical	Zhongshan district	5.1(Construction in two phases)	1.02	0.561	--	Proposed construction
Xin Guang Coking	Dashan Town, Panzhou City	2	0.4	0.22	The production of LNG and synthetic ammonia is expected	plan
Tianneng	Baiguo Town,Panzhou City	1.70 (Replacing the original 700,000 tons of production capacity)	0.34	0.187	The production of LNG and synthetic ammonia is expected	plan
Guineng	--	4	0.8	0.44	--	plan

The built, under construction and planned projects will produce a total of 3.108 billion cubic meters of hydrogen per year, or about 31.6 tons per day.

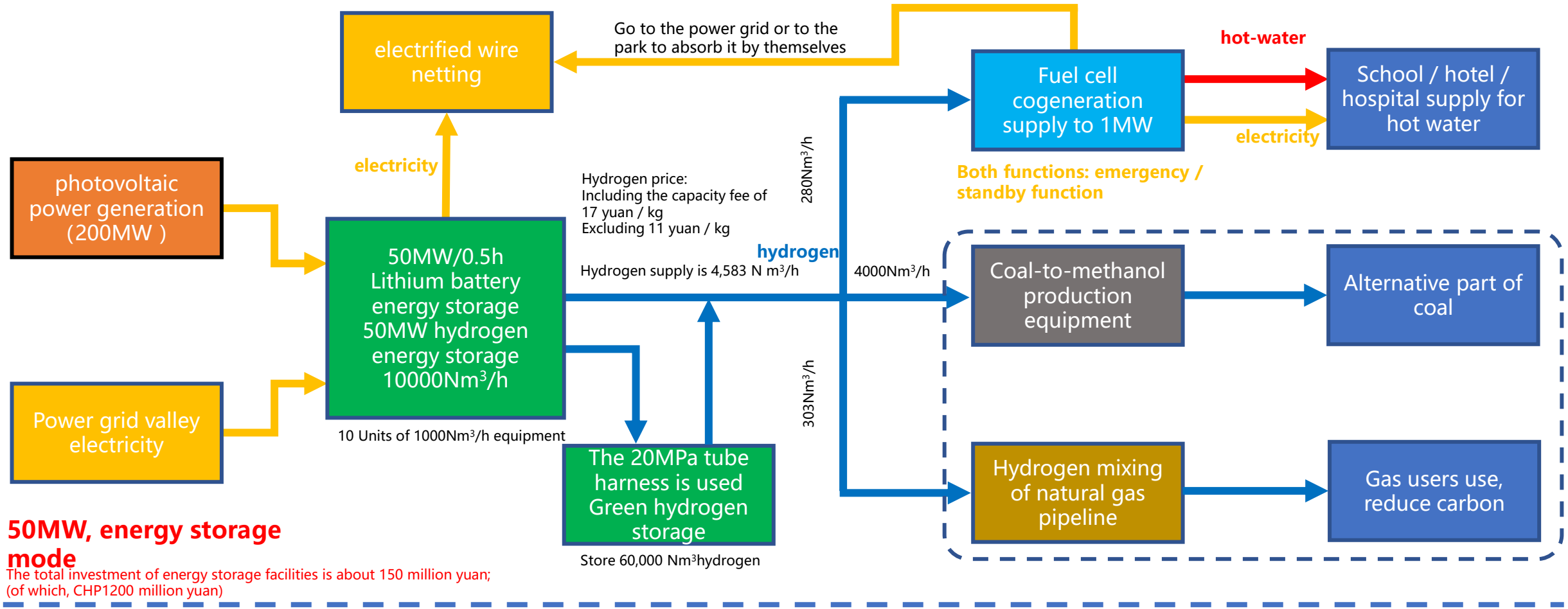
Liupanshui Hydrogen Energy Industry Planning Release and Hydrogen Energy Demonstration Project Construction

Liupanshui City Hydrogen Energy Industry Demonstration Project

Liupanshui Tianeng Coking hydrogen production plant phase I project (Scale: 280Nm^3/h)

The first oil and hydrogen joint construction station and the first hydrogen energy bus line in Guizhou Province

Multiple Energy Storage System



50MW, energy storage mode

The total investment of energy storage facilities is about 150 million yuan; (of which, CHP1200 million yuan)

The 200MW photovoltaic energy storage system adopts:
Lithium battery + hydrogen energy storage form;

Hydrogen production in peak photovoltaic output during the day, and in valley at night

Part of the hydrogen enters the pipeline for downstream use, and the excess hydrogen is stored and used in the no-hydrogen production stage

Green hydrogen to methanol can reduce coal consumption and increase the competitiveness of methanol, with a total annual carbon reduction of 36,000 tons

Mobile Hydrogen Energy Emergency Power Supply

Movable fuel cell

Energy supply robot

Future Opportunities for Sino-German Companies in Hydrogen Industry

Areas for cooperation with Germany

-

Multi-Energy coupling

Storage and Transportation of Hydrogen

Fixed power generation, hydrogen storage and transportation technology

Mainstream technology

Long-time power generation is mainly hydrogen mixed with pipeline natural gas and high-pressure hydrogen and methanol

Research technology

Ammonia, organic solution hydrogen storage, solid state hydrogen storage

Green chemical industry/ metallurgical hydrogen storage and transportation

Mainstream technology

Pipeline hydrogen transport

Research technology

Metallurgical process optimization combustion technology (burner, thermal field division characteristics, etc.)

感谢！

Thanks

Report by Guizhou Hydrogen Energy Efficiency Technologies Co., Ltd.

贵州氢能效率能源科技有限公司

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