中国氢能燃料电池技术和产业现状与前景
Current status and prospects of hydrogen and fuel cell technology and industry in China

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Outline

一、氢能源利用是我国能源结构调整和产业转型升级的重要途径

1. Hydrogen Energy is one of the important pathways to improve energy structure and upgrade industry in China

二、我国发展氢能源利用技术和产业的基础

2. Current Status of hydrogen and fuel cell technology and industry in China

三、下一步我国发展氢能源利用技术和产业的设想

3. The proposed objective and measures to develop hydrogen energy in near future

四、结语

4. Summary

1.1 氢能是现代能源技术的重要组成部分
A key role in modern energy system

◆ 氢能源有望成为与电同等重要的二次能源

Hydrogen is expected to be secondary energy as important as electricity

◆ 发展氢能源利用产业有助于实现从能源供给侧到能源消费侧的全产发业链转变，从而带来社会生产方式和生活方式的重要变革。

Developing hydrogen energy will promote the change of whole energy production chain from producing side to consuming side. Then it will bring the reform of social producing way and living style.

HTDI 1.2 氢能源是支撑可再生能源大规模发展的重要手段

To sustain the large scale renewable energy

◆ 我国以风能、太阳能为代表的可再生能源发展迅速

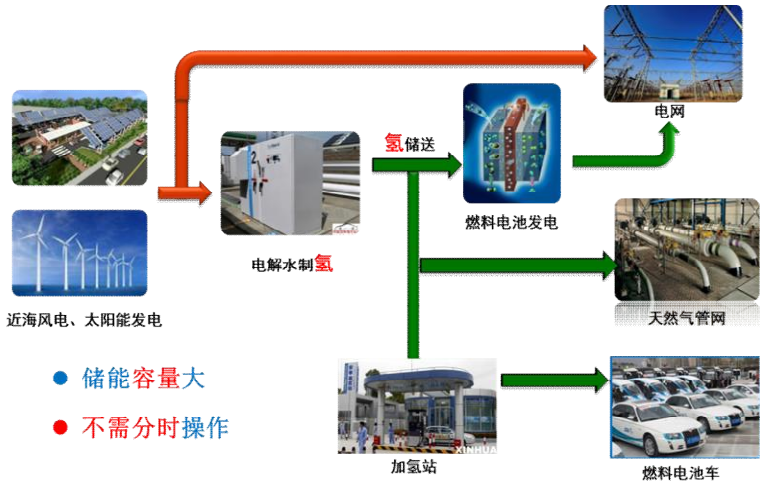
Wind, Solar energy grow fast in China

◆ 但风/光发电的间歇性和不可预测性限制了其大规模并入电网

Intermittence and unpredictability limit wind power and PV connected to grid

◆ 氢能提供了一种新型储能方式

Hydrogen energy is a new way of energy storage in large scale



1.3 推动燃料电池汽车、分布式供能等新兴产业的发展
To promote new industry such as EV, distributed power

◆ 燃料电池汽车作为新能源汽车，是汽车工业可持续发展的重要解决方案之一

As a new energy vehicle, FCV is considered as solution to the sustainable growth of automobile industry

◆ 燃料电池分布式供能系统发电效率比内燃机高，是未来分布式供能理想模式

FC distributed power system which holds higher efficiency than ICE is the ideal distributed power in future

◆ 燃料电池因其持续供电时间长等优势，在应急电源领域也具有重要应用价值

FC with long standby duration is applied in backup area

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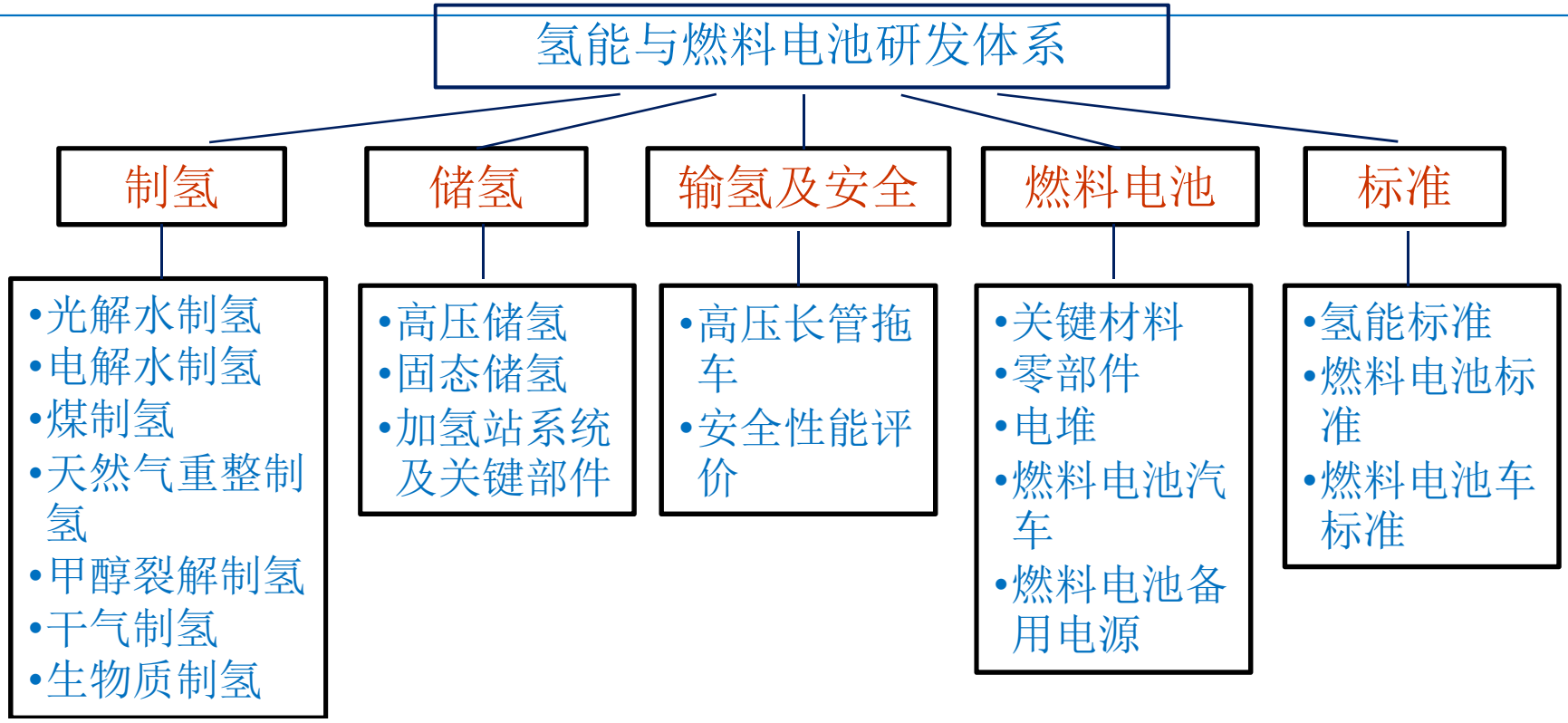
2.1 我国已初步形成氢能燃料电池技术的研发体系
R&D union is established in China

从“十五”开始，科技部通过“973”、“863”和“科技支撑”三大国家科技计划持续支持氢能与燃料电池研技术发，形成了以大学研究院所为主的研发体系

Since 2000, with the supporting and funding of national R&D programs, a R&D union which universities and institutes take the main part have been formed



2.1 我国已初步形成氢能燃料电池技术的研发体系
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- 2012年开始，我国在此领域发表的论文数，位居全球第一

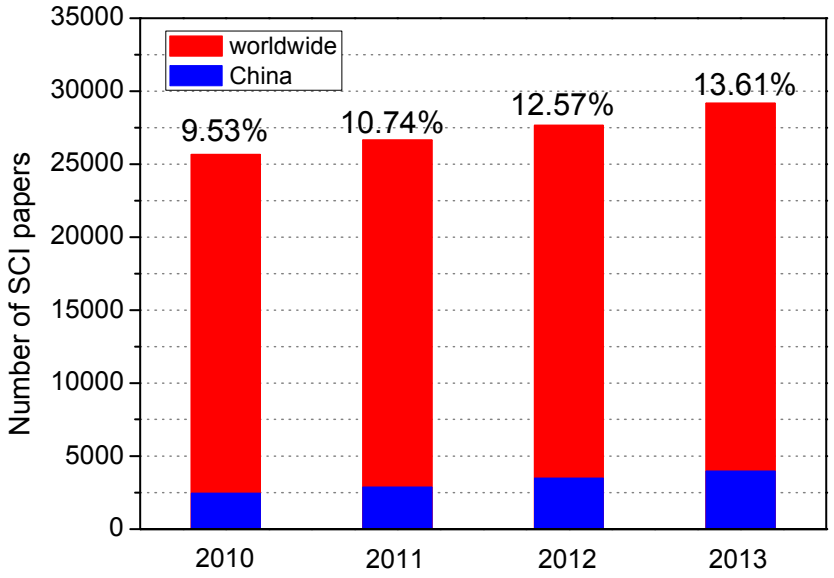
From 2012, number of published paper in this field ranks No1 in the world

- 已发布44项国家相关标准

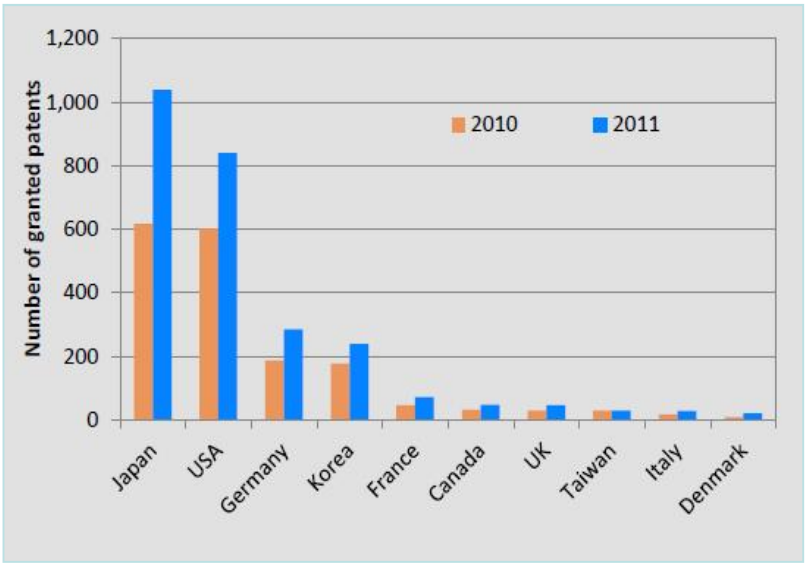
44related national standards have been issued

- 授权国际专利数全球排名第11位

International patents ranks 11th in the world

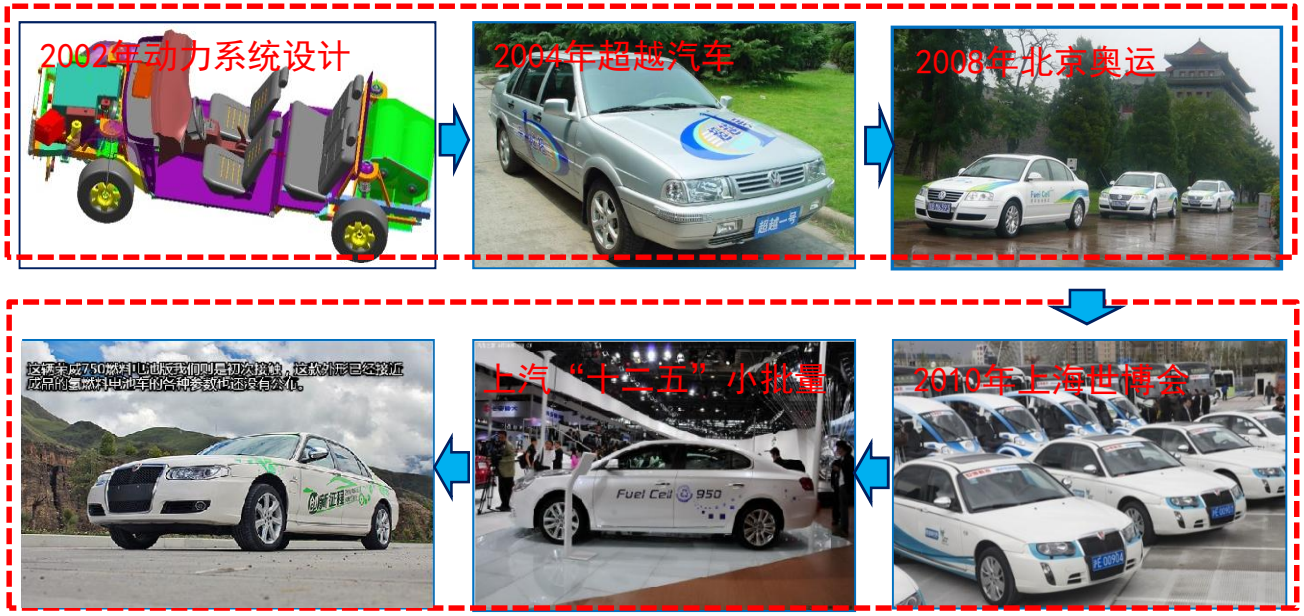


Published paper



International patent authorized

2.2 我国燃料电池商业化应用示范取得成果
Successful demo in China



上汽集团 SAIC MOTOR

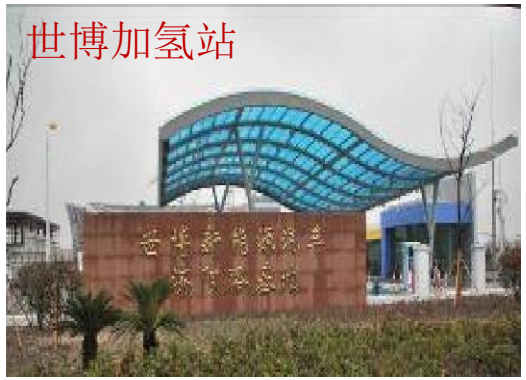
2008年北京奥运会，23辆燃料电池车进行了示范运行；2010年上海世博会，有173辆燃料电池车进行了半年高强度的示范运行。上海汽车集团开发出了荣威750燃料电池车，进行了途经64个城市行程万里的考核，今年有望实现100辆的小批量生产。

In 2008 Beijing Olympic games and in 2010 Shanghai Expo , 23 and 173 FCVs Demo running respectively. Shanghai Motor had developed Roewe 750 fuel cell car, which passed 64cities and drove 10,000km, and its property was also validated by driving in Tibet with high altitude and north area with low temperature.

2.2 我国燃料电池商业化应用示范取得成果
Successful demo in China

我国先后建成四座固定加氢站以及移动加氢装置，初步具备35MPa加氢站的设计、集成、建造和运营能力

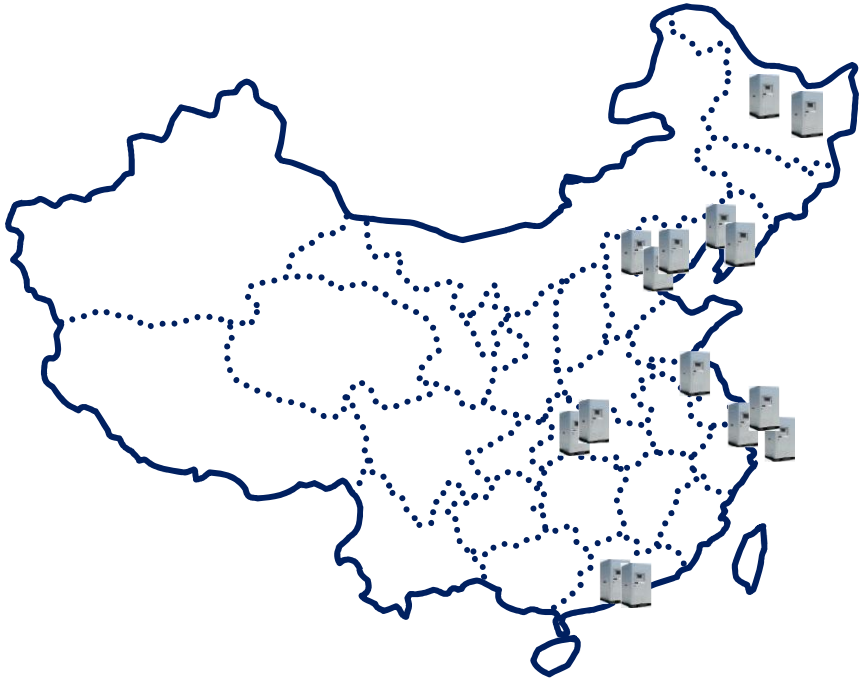
4 fueling stations and some mobile fueling vehicles have been constructed at 35MPa pressure lever.



2.2 我国燃料电池商业化应用示范取得成果
Successful demo in China

2009年迄今，中国移动、联通和电信已完成了近百台燃料电池应急备用电源的示范运营

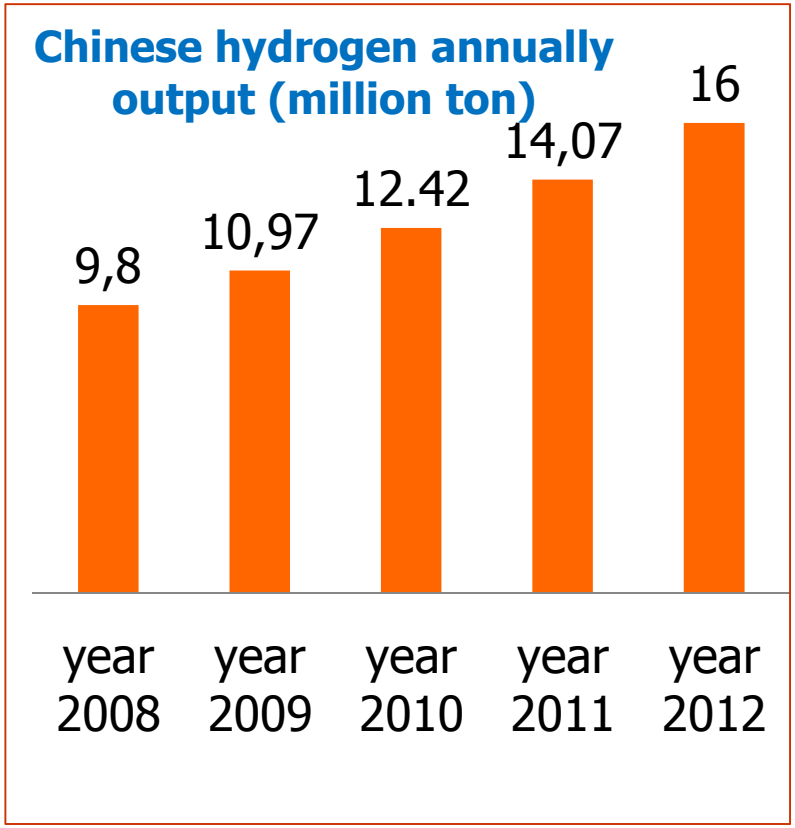
Since 2009, there have been over 100 demonstration stations with fuel cell backup power supply in China.

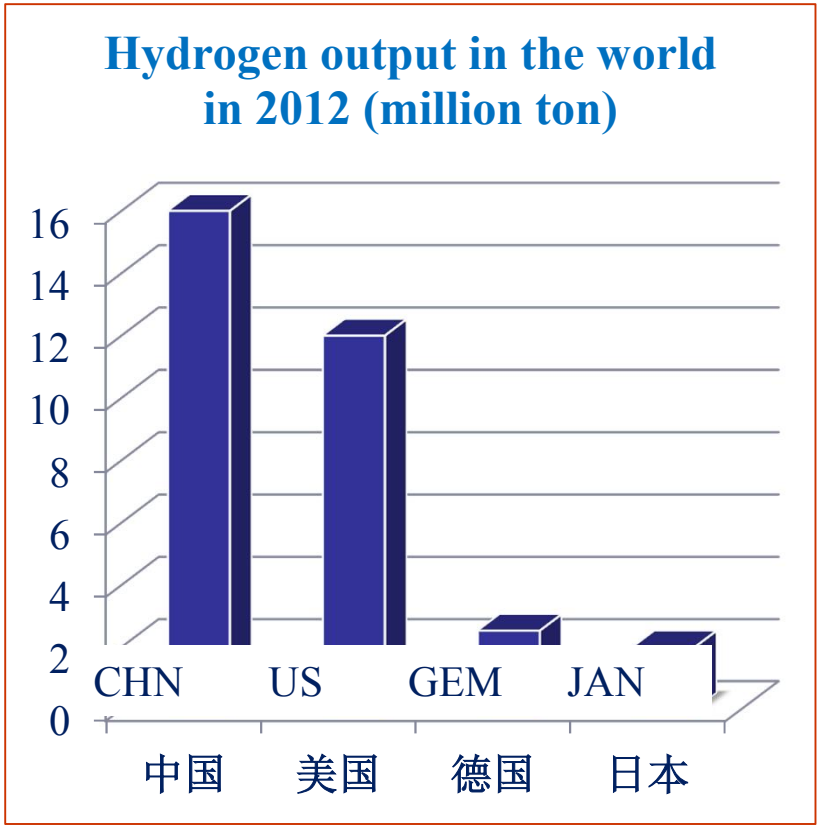


2.3 我国已初步具备发展氢能源的技术和产业基础
A good industry basis for hydrogen energy

我国制氢规模已位居世界首位，2012年产氢量达到1600万吨

The output of hydrogen is No1 in the world. In 2012, the output of hydrogen is 16millin tons.





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我国风电、光伏装机规模已居世界前列，截至2014年，风电装机97GW，光伏装机30GW。预计到2020年和2030年将分别达到200GW，100GW和400GW，270GW

By 2014, the capability of wind power and PV got to 97GW, 30GW in China. By 2020 and 2030, that will be 200GW, 100GW and 400GW ,270GW respectively.

There are abundand renewable energy to produce hydrogen.

2.3 我国已初步具备发展氢能源的技术和产业基础
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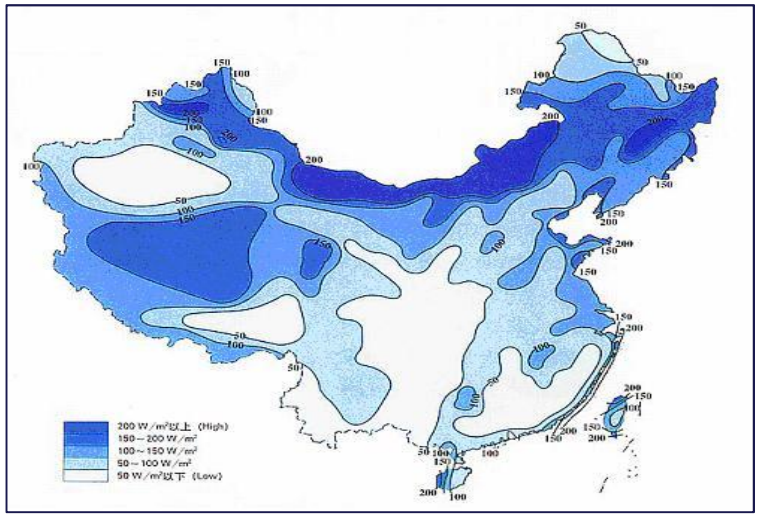
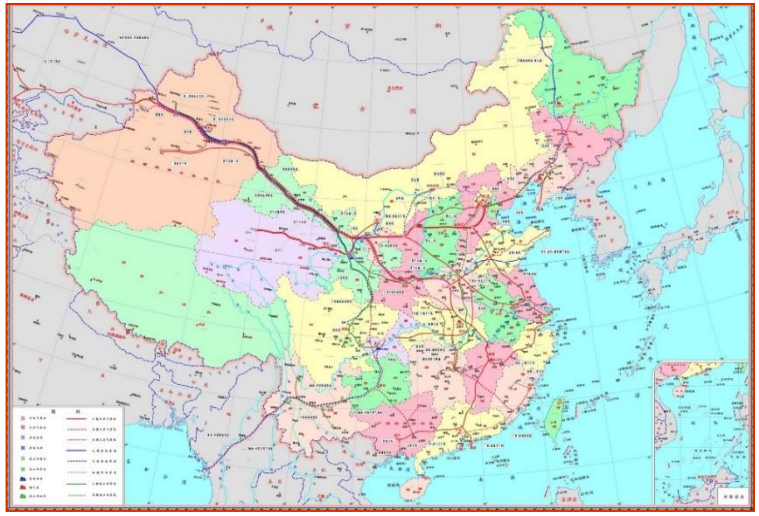
我国风光资源与天然气管网资源地理匹配性较好，通过风光等可再生能源制取的氢气可借助已有天然气管网进行输送

Wind and solar resources match with gas pipeline very well. So the hydrogen from renewable energy could be delivered by NG pipeline network.





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A good industry basis for hydrogen energy

我国稀土储氢材料连续3年产量保持1万吨/年，居世界首位

20MPa以下高压气态储氢钢质气瓶产量占世界的70%以上

10k tons/year output of Rare earth hydrogen storage materials for 5 years. 20MPa steel gas cylinders have accounted to 70% in the world.

2.3 我国已初步具备发展氢能源的技术和产业基础
A good industry basis for hydrogen energy

我国传统汽车、家电、发电等制造产业规模居世界首位，为燃料电池汽车、分布式供能等新兴产业发展提供了重要基础

Manufacture scale of automobile, white goods, dynamotor, etc. keeps the leading place in the world which will become the solid understructure to develop emerging industries such as FCV, distributed energy,etc.

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3.1 主要任务
Objective

一、发展制氢产业，逐步实现由化石能源制氢向可再生能源制氢转变；

1. By developing hydrogen energy to accomplish the shift gradually from fossil energy to renewable energy.

二、加快加氢基础设施建设，以加氢站为牵引，逐步形成氢能源供给网络；

2. By accelerating construction of infrastructure including fueling station to gradually form the hydrogen supply network.

三、拓展氢能源终端应用，以氢燃料电池汽车为龙头，带动分布式供能和应急备用电源等氢能源应用产业链的全面发展。

3. By expending end users to mature fuel cell market such as FEV, distributed energy and backup power.

3.2 目标
targets

◆ 近期目标（2020年）：

- 建立氢能源利用的标准与法规体系
- 突破核心关键技术，初步完成产业链布局
- 形成氢能燃料电池在应急备用电源分布式发电等特定需求领域的新市场

◆ Near term target(2020):

- To build standards and regulations
- To break through key technologies
- To raise backup power and distributed energy markets

◆ 远期目标（2050年）：

- 建成完善的基于可再生能源的氢燃料基础设施
- 燃料电池汽车、分布式供能成为主导产业
- 实现一次能源结构多元化、二次能源的氢-电交互网络化

◆ Long term target(2050)

- To construct mature hydrogen infrastructure and distributed energy system based on renewable energy
- FCV and distributed energy become dominant industries.
- To realize diversity of primary energy and internet of hydrogen-electricity.

3.3 措施
Measures

1.加强顶层设计

To strengthen top-lever design

2.实施氢能源利用科技重点专项

To propose national key R&D program of hydrogen energy

3.积极推进产学研协同创新

To encourage the coordination among industry, education and research

4.营造有利于氢能源利用产业发展的良好环境

To form a favoroble environment which benefit the development of hydrogen energy

四、结语
4. Summery

氢能作为能源利用的一种形态，因其可获得性、以及使用上的清洁、便利等特点，对调整能源消费结构，降低温室气体排放，应对气候变化等，有着重要意义，氢能技术和产业有着巨大的发展空间。我们希望在规范、标准、技术研发等方面进一步加强国际合作，共同推进氢能燃料电池技术及其产业发展。

Hydrogen energy will play an important role in coping with climate change. We are hoping to further strengthen international collaboration in the area of code, standard, and technology, etc., and to promote development of hydrogen energy technologies and industry.

HTDI

谢谢！

Thanks for your attention!