



# EU-CHINA ENERGY Cooperation Platform

## **IEA-ECECP Joint Workshop - *Clean energy innovation in China: The road ahead***

*This is a summary of the key points made during the online event, held on 7 September 2022.*

*Prepared by Christina Hadjiyianni and Helena Uhde, ECECP*

### **Highlights:**

- Innovative technologies are key for China to reach its climate goals.
- China has a strong innovation landscape: funding is available for technology innovation, market regulation and industrial policy.
- 14<sup>th</sup> Five-Year Plan underlines the importance of innovation in areas such as EVs, storage, hydrogen, CCUS, nuclear.
- Regional diversity and differences must be taken into account - demonstration projects are taking place across many cities at a local level.
- Chinese policies on clean energy aim to be carbon-neutral, in terms of different energies, prices, subsidies, and investment. Subsidies are available to both domestic and foreign companies.
- Cooperation on technology innovation can be successful only if it takes place when and where level playing field conditions for all business actors are ensured and protection of investment and intellectual property rights is guaranteed.
- The role for private enterprise is increasing, though large state-owned enterprises remain dominant.
- Potential:
  - o Energy efficiency: going from an air fuel combustion to an oxy fuel combustion could bring about a 10 to 30 per cent drop in fuel consumption.
  - o Sustainable transport: China is leader in automotive markets, i.e. automation, electric vehicles. A stronger focus on efficiency and a broader definition of 'new energy vehicles' could accelerate the shift towards sustainable transport.
  - o Green hydrogen: China has very clear objectives and solid measures for green hydrogen. Electrolytic hydrogen will focus on industrial innovation and overall system building. China is home to many projects targeting green hydrogen (e.g. there are seven new projects in Xinjiang), and cost improvements are likely.

### **Opening remarks by Octavian Stamate, Counsellor for Climate Action and Energy at the EU Delegation to China:**

- The key to meeting climate goals is the quick and effective deployment of new breakthrough technologies, as acknowledged in the 2019 EU China Joint Statement on energy cooperation.
- Cooperation on technology innovation can only be successful if there is a level playing field for all players and if protection of investment and intellectual property rights is guaranteed.
- EU and China need to pursue a clean energy transition under very challenging circumstances, i.e. disruption stemming from the war waged by the Russian Federation in Ukraine. Working together is crucial if the world's energy landscape is to be reshaped to meet climate goals and guarantee a sustainable, secure, and affordable supply of energy.

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**Opening remarks by Fang Xiaosong**, Director of International Affairs Department, Electric Power Planning and Engineering Institute (EPPEI):

- China attaches great importance to institutional development and a policy framework for energy innovation. The energy innovation sector has shown resilience despite the impact of Covid 19.
- Renewable energy power generation reached 1 225 trillion kWh, accounting for more than 30% of national electricity consumption.
- China has established corporations with more than 30 international organisations and is cooperating with more than 100 country and regions on clean energy.

**Opening remarks by Timur Gül**, Head of Energy Technology Policy, International Energy Agency:

- In September 2021, IEA published *An energy sector roadmap to carbon neutrality in China*, highlighting that innovation will be needed to meet China's dual carbon target of carbon peaking before 2030 and carbon neutrality before 2060.
- In March 2022, an innovation-specific report, *Tracking Clean Energy Innovation*, complemented this analysis, by mapping out the institutional and policy landscape of clean energy innovation in China.
- About half of the emissions savings necessary to reach net zero emissions by 2025 globally must come from technologies that are currently at demonstration or prototype stage.
- China's 14th Five-Year Plan (FYP) is an important step forward, as China has an important role in technology collaboration programs and in mission innovation.

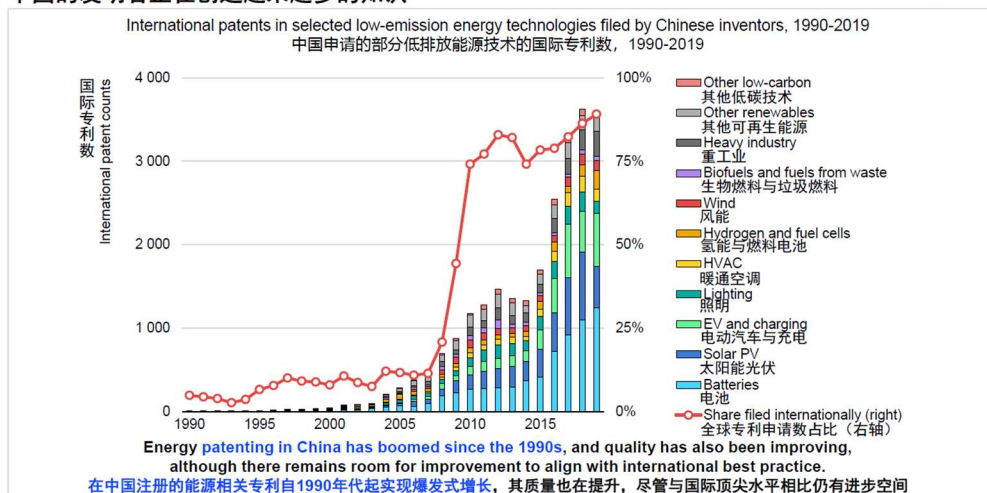
## Presentation of IEA Report *Tackling Clean Energy Innovation in China*

By Jean-Baptiste Le Marois, Energy Technology and Innovation Analyst, IEA:

- China has transitioned from an energy technology manufacturer to an innovator, e.g. solar PV.
- China has a particularly strong way of supporting innovation both through funding for technology innovation and also market regulation and industrial policy.

**Chinese inventors are creating more and more knowledge**

**中国的发明者正在创造越来越多的知识**



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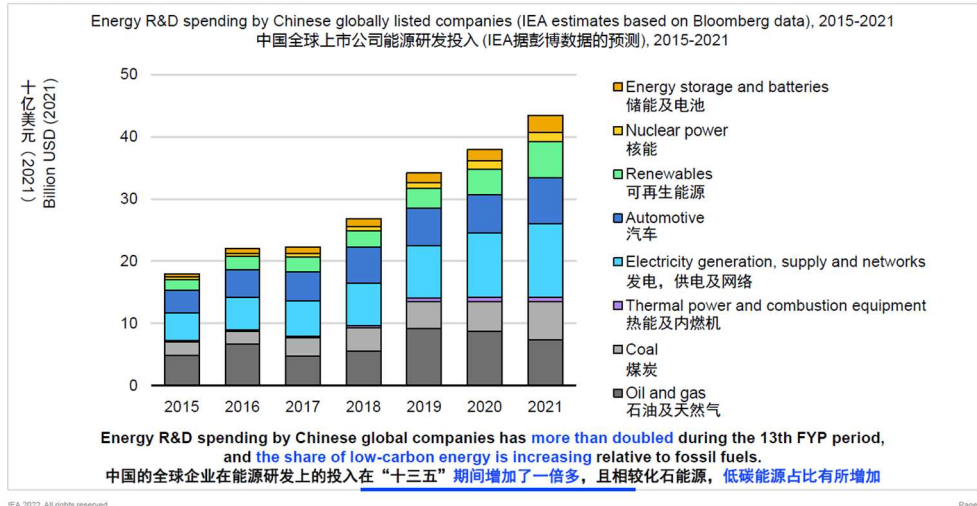
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- There is a growing role for individual companies, including for start-ups, for example in the EV sector. However, large state-owned enterprises remain dominant.

## Chinese global companies accelerate energy R&D efforts 中国的全球企业加速能源研发



- China is extending its knowledge base, and strategies to protect this knowledge and maintain intellectual property rights are improving, in contradiction of prevailing stereotypes.
- International collaboration has been at the core of China's innovation strategy in the last few decades e.g. investing abroad, acquiring firms outside China, and working in other countries.
- In the future, clean energy innovation will play a crucial role in China's climate objectives and especially in carbon-intensive sectors such as heavy industry and long distance transport, where much more innovation is needed.
- Four key strengths of China's clean energy innovation:
  1. Resources are available for innovation - funding and human capital.
  2. More effective and more dynamic knowledge is being developed, and research output is improving.
  3. Strong market levers for innovation - Chinese markets are unique in size and structure, and this allows the Chinese government to steer the country's innovation within its own market
  4. Coordinated decision making - China can quickly align different players - public, private and academic – because national priorities are the common goal.

## Round Table: The road ahead for China's clean energy innovation

**Moderator:** Joachim von Scheele (JvS), Global Director Commercialization, Linde

- **Gao Hu**, Director General, Energy Economics and Development Strategy Centre, NDRC Energy Research Institute
- **Wang Mo**, Associate Researcher, Institute of Strategic Planning, China National Nuclear Corporation
- **Liu Yi**, Deputy Dean, Sichuan Energy Internet Research Institute, Tsinghua University

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- **Mats Harborn**, President, Scania China Group

## Lessons learned and opportunities for cooperation:

Joachim von Scheele commented on the fact that energy intensity is two to three times higher in China per GDP per capita compared to the EU. He suggested that this offered scope to improve energy efficiency, citing as an example industrial furnaces, of which there are more than 100,000 accounting for about 25% of total energy use in China. Scheele noted that switching from an air fuel combustion to an oxy-fuel combustion could help fuel consumption drop by 10% to 30%. When the transition to hydrogen takes place, these measures would also help reduce the amount of hydrogen required.

Director General Gao Hu outlined some key developments taking place in China, including the establishment of legal systems for energy innovation in 2019 (a national law is in place to promote clean energy), as well as the numerous demonstration projects currently taking place across many cities. The 14<sup>th</sup> FYP sets a very clear direction for hydrogen and storage and aims to make the technology cleaner.

Mr Xian Zhang also provided an overview of the key actions contained in the 14<sup>th</sup> FYP, and discussed how the '5 plus 1' plan will continue to provide technical support to China's emissions reduction plan. He also announced that numerous new cities are being selected as demonstration cities, which will focus on low carbon, affordable technology. Finally, he indicated that China is also providing support to projects in developing countries, and in this area, cooperation with the EU will be vital.

Prof Mo Wang presented an overview of technology innovation in nuclear energy, and how nuclear energy will help to achieve carbon peaking and carbon neutrality. Prof Wang provided an overview of the '1 + N' policy system and its five main goals, which have been introduced successfully in China. He gave an overview of HPR1000 (Hualong One), which is now commercially operational, in demonstration of China's independent mastery of third-generation nuclear power technology. The 14<sup>th</sup> FYP plan will see more investment into nuclear technology.

Dr Liu Yi provided an overview of the increasing importance and popularity of EVs in China and stressed that cooperation on hydrogen between EU and China would be crucial in the coming years. Mr Mats Harborn offered a corporate perspective to the discussion, providing an insight into China's leadership when it comes to the automotive markets (electric, self-driving etc). His view is that the shift towards sustainable transport solutions is being hampered by an overly-narrow definition of 'new electric vehicles'. Mr Harborn suggested that the definition promotes advanced technologies, i.e. battery, hydrogen, hybrid etc., but these will not provide an immediate drop in carbon emissions. He proposed more incentives for alternative fuels, e.g. biofuels. The panel also discussed the need to improve efficiency in the transportation industry.

## Q1. What does the future of nuclear cooperation look like?

Response from Professor Mo Wang.

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- China promotes the development of nuclear power in a proactive manner, while prioritising safety and security.
- COVID-19 has made international cooperation more challenging, and it has become harder for countries to share core technologies. China will always look to cooperate, particularly especially in new advanced reactors such as SMRs.

## **Q2. How can we strike a balance between international cooperation and helping to create a level playing field?**

Response from Gao Hu.

- Chinese policies on clean energy are neutral, in terms of different energies, and in terms of prices, subsidies, and investment.
- Subsidies are available to both domestic and foreign companies, in order to create a neutral playing field. China has reaped substantial benefits from international cooperation.

## **Q3. What does the hydrogen transition look like in China? Will it be blue hydrogen (CCS) or green hydrogen? What about the option of carbon capture?**

Response from Joachim von Scheele:

- There will be a mixture of different hydrogen types in coming years; it is likely that there will be a scaling up and further development in solid oxides (fuel cells).

Response from Liu Yi:

- China has clear objectives and solid measures for green hydrogen. Electrolytic hydrogen will focus on industrial innovation and overall system building. There are lots of projects currently targeting green hydrogen, for example the seven new projects in Xinjiang – and so cost improvements are anticipated.

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