

● OCTOBER 2020

CHINA ENERGY POLICY NEWSLETTER

Boosting Renewable Energy as Part of China's Energy Revolution

1. Project activities

DEA presents at China Wind Power 2020

On 15 October 2020, the Deputy Director General of the Danish Energy Agency (DEA), Mr. Stig Uffe Pedersen, delivered a keynote speech at the China Wind Power 2020 in Beijing, where he welcomed President Xi Jinping's commitment on China's efforts to achieve carbon neutrality by 2060. Furthermore, Mr. Pedersen commended the excellent cooperation on green energy transition that DEA has established with key Chinese institutions since 2006, including the ongoing *Quality Offshore Wind* cooperation with the National Energy Administration (NEA).

The speech by Mr. Pedersen, titled "Denmark's path on energy transformation towards 2050", outlined the Danish aim to be climate neutral in 2050, i.e. achieving net zero GHG emissions in total – covering all direct energy use in Denmark and non-energy related emissions from agriculture, forests, soils and industry. This will likely entail a massive electrification both directly and indirectly, where the abundant Danish offshore wind resources will play a key role. Between now and 2030, Denmark expects to commission around 7.6 GW of new offshore wind capacity.

As a steppingstone in achieving its 70% GHG reduction target in 2030, the Danish parliament has agreed on a new and ambitious build-out of offshore wind, taking offshore wind to the next level by introducing two energy islands. Hereby more parts of society can be electrified in the coming years, and at the same time contribute to ensuring that all Danish households and companies are covered by green electricity. The energy from the energy islands can also be exported to the neighboring countries and thus contribute to the green transition in Europe – an important milestone making the North Sea the battery of Europe. Furthermore, the energy islands will provide power potentially for establishing green "Power-to-X" fuels, such as hydrogen and ammonia.

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Webinar - China's Electric Power Sector Transformation

On 30 September 2020, the Energy Agency (IEA), DEA, the China Electric Power Planning & Engineering Institute (EPPEI) and the Royal Danish Embassy (RDE) in Beijing jointly hosted a webinar on power market reform, targeting Chinese stakeholders. Mr. Pablo Hevia-Koch from DEA presented the newly launched *Three Region Report*, gathering experiences from the development of flexibility measures in Europe, Western USA and China and focusing on technical and policy measures developed with local context awareness. The report can be downloaded [here](#).

The webinar was opened by the Deputy Head of Mission, Ambassador Ms. Helle Meinertz from RDE. She said that the power market reform became even more urgent following Xi Jinping's pledge to become carbon neutral before 2060 and peaking CO₂ emissions before 2030. That message was echoed by Mr. Wang Shunchao from EPPEI estimating that non-fossil power generation will account for up to 80% of consumption as early as 2050. That requires more flexibility from power plants and consumers in the future, just like improved production forecasts will be key in ensuring energy security in the future according to Ms. Li Qionghui, from State Grid Energy Research Institute. Based on an IEA mapping of international power markets, Mr. Peerapat Vithayasrichareon pointed out that it is possible to design power markets where fluctuating energy resources make up almost all generation in some periods. And that these measures could also reduce costs. He assessed that China could save as much as USD 60 billion by implementing more efficient market design. Presentations will be available for download on the IEA website soon.

2. China energy transition updates

China pledges stronger climate change targets towards 2060

On 22 September 2020, the Chinese president Xi Jinping announced the enhancement of national climate change pledges at the 75th session of the United Nations General Assembly. According to the announcement, China aims to peak CO₂ emissions prior 2030 and to achieve carbon neutrality by 2060.¹ Compared to the original target determined in 2015, which is to make CO₂ emissions peak around 2030, the new targets provide a more powerful and clear political signal to both domestic and international society about the determination of China on tackling climate change.

China proposed the quantitative emission reduction targets for the first time in 2009 – to reduce carbon emissions per RMB 10,000 of GDP by 40% to 45% by 2020 compared to 2005. Meanwhile, to increase the share of non-fossil fuel in primary energy consumption to 15% by 2020. According to the Ministry of Ecological Environment (MEE), China has achieved both of the targets in 2019, i.e. 48.1% of carbon emissions reduction and a 15.2% share of non-fossil fuel in primary energy consumption.² From 2015 to 2019, China invested over USD 100 billion in renewable energy sector each year; energy consumption per RMB 10,000 of industrial added value³ decreased by over 25%. In addition, the seven Chinese regional ETS pilots have jointly become the second largest carbon market in the world from trading volume perspective.⁴

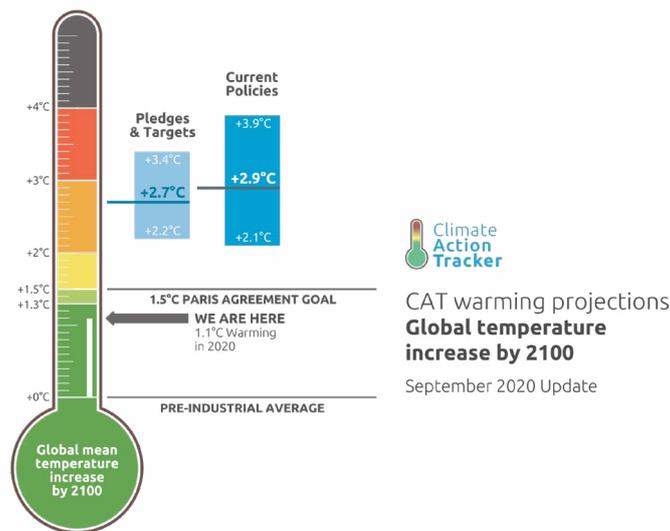
¹ "China calls for global green revolution in the post-COVID era," China Global Television Network, 24 September 2020, accessed at <https://news.cgtn.com/news/2020-09-22/Xi-Jinping-China-aims-to-achieve-carbon-neutrality-by-2060-TZX22EfJiE/index.html>.

² 生态环境部：中国提前完成碳减排2020年目标," The Paper, 25 September 2020, accessed at https://www.sohu.com/a/420785682_260616.

³ Only the industrial enterprises with over RMB 5 million of annual revenue is counted.

⁴ 生态环境部刘友宾：中国试点碳市场已成为全球配额成交量第二大碳市场," China Business Network, 27 September 2020, accessed at <http://www.chinapower.com.cn/jnhb/jdtt/20200927/31104.html>.

Based on the projection of Climate Action Tracker, the achievement of China's new pledges would decrease global warming by around 0.2 °C to 0.3 °C.⁵ The vice chairman of China National Expert Committee on Climate Change, Mr He Jiankun, believes that China needs to lower carbon emission down to nearly zero by 2050 in order to achieve carbon neutrality by 2060. Establishing a sustainable energy system dominated by new and renewable energy requires great changes in the economic, energy, and technological systems, but in the meantime, such transformation will bring co-benefits of economic competitiveness, social development and environmental protection to the country.⁶ The *China Renewable Energy Outlook 2019* issued by the Energy Research Institute of the National Development and Reform Commission (ERI of NDRC) earlier in March 2020 has proposed a feasible energy transition route for China towards 2050. Renewable energy expansion, coal consumption control, electricity replacement of fossil fuel and energy efficiency improvement are the key pillars to establish a clean, low-carbon, safe and efficient energy system.⁷



Source: Climate Action Tracker, September 2020

Wind and PV power capacity remains rapid growth in 2020

Since 2020, wind and solar power generation both have maintained relatively rapid growth, and power generation efficiency has gradually increased. In the first eight months of 2020, the total grid-connected wind power capacity reached 220 GW with a 12.2% year-on-year growth rate, while solar PV reached 220 GW with a 17% year-on-year growth rate. Meanwhile, the average utilization hours of wind power reached 1,417 hours, an increase of 29 hours year-on-year; and solar power achieved 897 hours, which is two hours less than in the same period in 2019. On the contrary, the utilization hours of thermal power continued to decrease. From January to August 2020, its average utilization hours were 2,718 hours, a 113 year-on-year decrease, of which coal power was 2,785 hours and gas power was 1,717 hours.⁸

⁵ "China going carbon neutral before 2060 would lower warming projections by around 0.2 to 0.3 degrees C," Climate Action Tracker, 23 September 2020, accessed at <https://climateactiontracker.org/press/china-carbon-neutral-before-2060-would-lower-warming-projections-by-around-2-to-3-tenths-of-a-degree/>.

⁶ Diao Fanchao, "中国提出努力争取2060年前实现碳中和意味着什么," The Paper, 23 September 2020, accessed at https://www.thepaper.cn/newsDetail_forward_9308251.

⁷ "China Renewable Energy Outlook 2019," Energy Research Institute of the National Development and Reform Commission, 30 March 2020, accessed at <http://boostre.cnrec.org.cn/index.php/2020/03/30/china-renewable-energy-outlook-2019-2/?lang=en>.

⁸ "2020年1-8月份电力工业运行简况," China Electricity Council, 19 September 2020, accessed at <https://www.cec.org.cn/detail/index.html?3-288305>.

NDRC, MoF and NEA jointly determine the 2020 biomass power subsidizing plan

The central government sets up an annual subsidizing cap for biomass power projects for the first time.⁹ The Ministry of Finance (MoF) provides RMB 1.5 billion of budget for 2020. The new biomass power plants with all units connected to the grid since 20 January 2020 will receive the subsidy based on the first come first reserve principle. The grid-connected projects beyond the 2020 budget will queue up for the 2021 subsidies. From 2021, MoF will not solely provide the subsidy, i.e. local governments will take responsibility to provide certain share of the subsidy. Meanwhile, the portion of MoF will be gradually decreased year by year. Newly approved biomass power generation projects since 2021, and those who are approved but cannot start to operate in 2020, should all participate in the tendering process to receive the subsidies.

The formulae for calculating the amount of subsidies for different types of biomass power generation projects are shown as below:

- **Agricultural and forestry biomass project** = project installed capacity x national average utilization hour of agricultural and forestry biomass power in 2019 x (RMB 0.75/kWh – local coal power benchmark feed-in tariffs)
- **Urban waste biomass project** = annual garbage disposal capacity x 280 kWh/t x (RMB 0.65/kWh – local coal power benchmark feed-in tariffs – RMB 0.1/kWh)
- **Biogas power project** = project install capacity x national average utilization hour of biogas power in 2019 x RMB 0.25/kWh

The professor at the ERI of NDRC, Ms. Shi Jingli, comments that this policy document clarifies the policy direction of biomass power generation in 2020 and few years afterwards. The newly added capacity depending on the central budget will effectively avoid delay of subsidy payment to the new projects, while the requirements of participating tenders and gradually phasing out central subsidies since 2021 remind new project developers to adjust their business models and income channels accordingly in advance. Nevertheless, considering the necessity of policy continuity and predictability, the policy makers still keep majority of the regulations unchanged.

The incentive support for fuel cell vehicle development has been decided

The central government will provide incentives for city clusters that implement fuel cell vehicle demonstration projects instead of directly subsidizing purchase of fuel cell vehicles.¹⁰ The new incentive measures aim to establish a complete industrial chain for the fuel cell vehicle sector. In order to receive the incentives, the city clusters should run more than 1,000 of fuel cell vehicles¹¹ and operate more than 15 hydrogen fueling station. Most importantly, the terminal price of vehicle-used hydrogen should be less than RMB 35/kg. The amount of incentives is determined based on a credit system. The central government provides RMB 100,000 of funding for each point of credit collected, but the funding per each point will decrease year by year. The funding cap for hydrogen energy supply is RMB 200 million, while for the promotion and application of fuel cell vehicles is RMB 1.5 billion. According to MoF, the funding will focus on supporting industrialization of key technical components with independent intellectual property rights, as well as industrialization of heavy-duty fuel cell vehicles.¹²

⁹ “关于印发《完善生物质发电项目建设运行的实施方案》的通知，发改能源〔2020〕1421号,” National Development and Reform Commission, Ministry of Finance, National Energy Administration, 11 September 2020, accessed at https://www.ndrc.gov.cn/xxgk/zcfb/tz/202009/t20200916_1238868.html.

¹⁰ “财政部 工业和信息化部 科技部 发展改革委 国家能源局关于开展燃料电池汽车示范应用的通知，财建〔2020〕394号,” Ministry of Finance, Ministry of Industry and Information Technology, Ministry of Science and Technology, et al., 16 September 2020, accessed at http://www.gov.cn/zhengce/zhengceku/2020-09/21/content_5545221.htm.

¹¹ The fuel cell vehicles should meet specific technical criteria.

¹² “财政部经建司：开展燃料电池汽车示范应用的核心目标是打造自主可控的产业链,” Auto.163.com, 6 September 2020, accessed at <http://www.escn.com.cn/news/show-1094419.html>.

The China Electric Power Law will interact with the China Renewable Energy Law

The *China Electric Power Law* is under the fourth amendment led by the Ministry of Justice (MoJ). The People's Congress introduced the *Law* for the first time in 1996 and then amended it in 2009, 2015 and 2018.¹³ However, the current content does not match with the national strategy of power system liberalization, as well as the major policies issued by the State Council regarding new energy, distributed energy, power markets, and administration simplification. The fourth amendment aims to remove the barriers in the power sector reform and in the new and renewable energy development. Therefore, the *Law* would interact with the *China Renewable Energy Law* in order to eliminate the grid connection difficulties of renewable power projects by adding new terms such as "to implement grid connection on time and to provide non-discriminatory and barrier-free grid connection services to renewable power projects".¹⁴

Qinghai achieves 100% hydro-wind-PV power export through UHV transmission line

In September 2020, the first batch of renewable power projects specifically supporting the Qinghai-Henan ± 800 kV Ultra-High-Voltage DC transmission line were fully connected to the grid in Qinghai. It consists of 3 GW of solar PV, 2 GW of wind power and 1.46 GW of hydropower capacity with large-scale energy storage facilities. The transmission line is the first UHV transmission line built in Qinghai, which has 8 GW of rated capacity and able to transmit 41.2 TWh of electricity annually.¹⁵ The successful grid connection of these projects made the transmission line to become the first UHV transmission line in China that delivers 100% of hydro-wind-PV integrated electricity. For the next step, the provincial government plans to approve the second UHV transmission line in 2020 with 5 GW of wind and PV power supporting projects to further facilitate renewable development.¹⁶

China will formulate China-EU Energy Cooperation Roadmap (2021-2025)

The Ministry of Industry and Information Technology (MIIT) announced the enhancement of international cooperation in energy technology and equipment sectors. On the one hand, China will promote importing advanced foreign technologies and jointly formulate the *China-EU Energy Cooperation Roadmap (2021-2025)* with EU partners in order to strengthen pragmatic cooperation on energy technology innovation. On the other hand, the central government will specifically support export of efficient and cost-effective renewable power, advanced nuclear power and flexible coal power facilities with focus of the Belt and Road markets.¹⁷

¹³ "历经多次修订,《电力法》有哪些内容变化?" Semeureka, 20 April 2019, accessed at https://www.sohu.com/a/309285555_99919439.

¹⁴ "新修订《电力法》将与《可再生能源法》相衔接 解决可再生能源上网难等问题," Solarbe.com, 29 September 2020, accessed at <http://guangfu.bjx.com.cn/news/20200929/1107758.shtml>.

¹⁵ "世界首条100%输送清洁能源特高压线路正式通电," People.cn, 30 September 2020, accessed at <http://qh.people.com.cn/n2/2020/0930/c378418-34329845.html>.

¹⁶ "青豫直流通电仪式启动,青海再添5GW风、光电力," PVMEN, 30 September 2020, accessed at <http://www.es.cn.com.cn/news/show-1102953.html>.

¹⁷ "对十三届全国人大三次会议第7662号建议的答复,工信建议〔2020〕78号," the Ministry of Industry and Information Technology, 27 August 2020, accessed at <http://www.miit.gov.cn/n1146295/n1146592/n3917132/n4545264/c8081393/content.html>.

3. Economic analysis of hydrogen energy towards 2050 in China



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Overview of hydrogen energy cost in 2020

Hydrogen energy is a major energy source in the industry and an important secondary energy to support green energy transition. Hydrogen is easy to store and has broad application in areas, and it can be converted across different energy networks. Nevertheless, it also faces practical challenges such as technological maturity, lack applicable industries and security issues. With higher penetration of renewable energy and cost reduction of fuel cells in the future, hydrogen energy-based applications will become more competitive. Particularly, hydrogen is expected to be technically feasible and cost-effective in the heavy-duty transportation industry, as well as to be a valuable energy source in a renewable energy dominated power sector.

The cost of hydrogen energy covers production, transportation, storage and fueling sections. The cost of different types of hydrogen production vary greatly. ”



Electrolysis of water

RMB 20-40/kg
(electricity price RMB 0.3-0.8/kWh)



Curtailed RE power

the lowest RMB 10/kg
(electricity price RMB 0.1/kWh)



Fossil fuel

Coal for RMB 10/kg
Natural gas for RMB 25-30/kg



Industrial by-products

RMB 8-14/kg



Transportation and storage

A 20MPa tube trailer per 100km costs RMB 7/kg, it is currently a cost-effective short-distance transport method adopted in China. Liquid hydrogen trailers and hydrogen pipelines are still immature and lack standards. With expansion of the market, they will become more cost-effective.



Fueling

Over RMB 15/kg for 500kg/day of fueling capacity. The cost mainly depends on the scale of fueling stations. The cost will drop significantly provided the the fueling capacity reaches over one tonne or two tonnes per day.



The purchase price of hydrogen for vehicles is over RMB 40/kg assuming the use of industrial by-product hydrogen, 200 km of high-pressure transportation and storage, and 500kg/day fueling mode.

2050 outlook of RE-produced hydrogen energy

The transport sector will be the major RE-produced hydrogen consumption sector. By 2030, fuel cell vehicles are expected to consume 1.5 million tonnes of RE-produced hydrogen; by 2050, road and marine transport would jointly consume over 30 million tonnes of RE-produced hydrogen, nearly 80% of annual RE-produced hydrogen production.

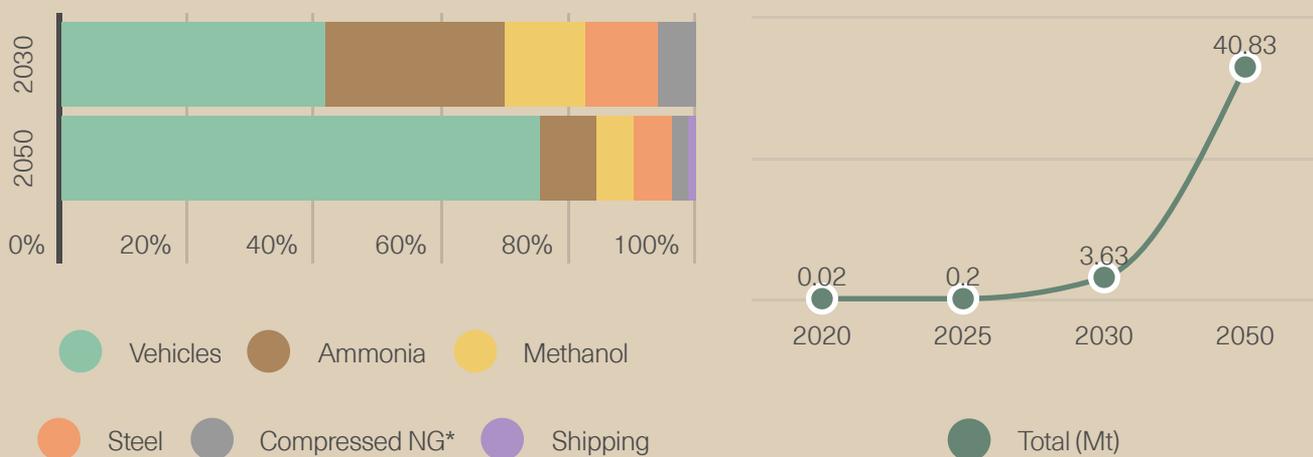


In non-transport sectors, the highest accepted terminal hydrogen price in 2030 is expected to be RMB 6-15/kg. Utilization of hydrogen will be cost-effective in specific fields that have requirements of short-distance and centralized transport of hydrogen regardless of the way of production. An increasing share of renewable power, RE-produced hydrogen is expected to replace fossil fuel from economic perspective in steel, ammonia and methanol production by 2050.



In the transport sector, the highest acceptable terminal hydrogen price in 2030 is expected to be close to RMB 40/kg, making fuel cell vehicles to be almost competitive with EV. While large-scale fuel cell buses are expected to achieve price parity prior 2050.

2050 RE-produced hydrogen consumption



Note: * compressed natural gas.



POLICY SUGGESTIONS

Improve top-layer policy design

To define the energy and chemical properties of hydrogen from a legislative level in order to establish a good foundation for formulation of policies and standards in the future.



Enhance R&D of key technologies, carry out demonstrations

To support independent R&D of large-scale and cost-effective RE-produced hydrogen, hydrogen transportation and storage, and fuel cell technologies from incentive and project approval perspectives.



Encourage infrastructure construction

To explore new business models such as natural gas and hydrogen joint fueling stations and provide subsidies for hydrogen fueling.

4. Policy monitoring

2020-09-28

https://www.ndrc.gov.cn/xxgk/zcfb/ghxwj/202009/t20200930_1243682.html

NDRC determines 2020-2022 T&D tariffs for all provinces and regions

Notice to Determine Power Transmission and Distribution Tariffs of Provincial Grids, NDRC Pricing [2020] No. 1508

The period of 2020-2022 is the second time for the NDRC to determine the power transmission and distribution (T&D) tariffs, it means that China has basically set up a supervisory system to determine T&D tariffs regularly. Compared to the first period from 2018 to 2019, it determines T&D tariffs covering all provinces and regions, introduces theoretical T&D tariffs by voltage level, and involves the grid-to-grid power transmission tariffs into provincial T&D tariffs for the first time. Based on NDRC's interpretation, these new rules optimize the mix of T&D tariffs, and decreases the T&D tariffs of large-scale industrial consumers in majority provinces. It also determines reasonable power export tariffs in order to optimize utilization of power supply resources in broader regions.¹⁸

2020-09-08

https://www.ndrc.gov.cn/xxgk/zcfb/tz/202009/t20200925_1239582.html

NDRC makes clear the new growth point in new energy industry

Guiding Opinions on Expanding Investment in Strategic Emerging Industries to Create New Growth Point, NDRC Technology [2020] No. 1409

The central government has listed new energy industry as one of the eight strategic emerging industries. The new energy sector should focus on the R&D of core equipment techniques including the main bearing, IGBT, control system and high-voltage DC submarine cables. The industry also aims to break through the technical bottlenecks in the fields of wind-solar-hydro-storage integration, advanced fuel cells, efficient energy storage and marine power, as well as to build infrastructure networks including smart grid, micro-grid, distributed energy and new-type energy storage facility, hydrogen production and refueling stations and fuel cells. In addition, cross-energy-sector service, generation-transmission-load-storage integration and utilization of straw under feasible resources conditions are also encouraged. The central government will adopt policies of finance, land use, technology, talent and intellectual property to support industrial clusters, leading enterprises, key technique R&D and capacity building in the fields mentioned above.

¹⁸ "国家发展改革委核定省级电网第二监管周期输配电价," the National Development and Reform Commission, 30 September 2020, accessed at https://www.ndrc.gov.cn/xwdt/xwfb/202009/t20200930_1241310_ext.html.