The Future of China-U.S. Energy Cooperation

Executive Summary

On June 15th, 2017, China Carbon Forum brought together an expert panel for a discussion on "China-U.S. Energy Cooperation", at Peking University Law School in Beijing. Cooperation on energy and low-carbon development have been a positive aspect to the bilateral relationship in recent years, and was important element contributing momentum to the successful conclusion of the Paris Agreement.

This meeting came at a time of uncertainty given the recent announcement of the U.S. government's intention to withdraw from the Paris Agreement. Despite this, there is widespread scope for China-U.S. energy cooperation both short-term and long-term, particularly in the areas of transport, research, real estate, emissions reduction and financing. The role of NGOs, private enterprises, cities and states were highlighted as a means to facilitating meaningful change, as well as the exchange of knowledge and technology.

Record of Discussion

Both China and the U.S. are countries with vast territories, and there is a need for innovative technology in the power sector to overcome the challenges of decarbonisation. Both countries are currently upgrading the reliability and environmental performance of their energy systems. The U.S. has managed to reduce its once dominant coal power sector to about 30% of power generation in 2016. This is in large part due to the rapid increase in the availability of natural gas, an area in which China also has ambitious goals, with interest being shown in U.S. technologies to extract non-conventional natural gas. The U.S. is still a leader in green technology and the energy sector, largely due to the private sector taking advantage of market opportunities. Panellists highlighted that although President Trump had proposed to cut federal government investment in renewable energy, he also proposed to increase the National Laboratory budget, and within the national labs, the energy efficiency budget has not been cut.

However, the annual Climate Change Working Group meeting, and the accompanying Climate Smart City Summit scheduled to take place in Boston this year, is unlikely to take place. Furthermore, new initiatives on energy and water technology might see less support due to dependence on support from the Department of Energy. However, diversification of funding, such as non-governmental funding, would increase resilience of such programs. Local-level cooperation such

as between California and China, and that joint U.S.-China work on building energy efficiency, still receives a large amount of support, both from government and other sources.

Buildings

There is strong interest in building energy efficiency, including retrofitting, in northern China. Increased efficiency would help to alleviate concerns around smog in northern provinces, with four Chinese government ministries currently investing in a clean-energy heating project in north China. The Clean Energy Research Centre Buildings Program (CERCB) is currently leading the Chinese government in clean-energy heating in buildings.

Urban development is an area which the US and China have a lot of experience in cooperation, with many demonstration projects being implemented over the years. Whilst funding from the U.S. central government will most likely be cut, and China has less experience than Europe in clean heating in winter, the panel seemed confident that there would still be ways to cooperate. Namely, they discussed the Natural Resources Defense Council's pilot projects in Hebei province, and the scope for further demonstrations and cooperation in the Xiong'an area, which is already under construction by the Chinese government. It was suggested that where the U.S. government may become less involved in some areas, that this may create a space for enhanced cooperation with NGOs.

Real estate and the building sector were highlighted as an area for future development due to the U.S.'s emphasis on renewable technology for buildings, and its work towards zero CO_2 emissions in a sector which contributes to 35 per cent of its energy consumption. Many of China's buildings do not comply with government standards, therefore the building sector is an area within which cooperation can be furthered, particularly in light of the technologies already in place in the U.S. Building labelling could fall under this category of cooperation, particularly between the U.S. Leadership in Energy and Environmental Design (LEED) labelling, and Chinese three-star green-building labelling, which are updated annually. LEED emphasizes energy-efficiency amongst other environmental areas, whilst China includes outcome-based building codes centred on operation as well. China has done a lot of work in this area, and has some of the strictest regulations in the world in a bid to develop buildings that consume zero energy, however the government does not recognize LEED labelling.

Starting from this year, the NDRC has set a quota for public heating to use a certain quota of renewable energy. Therefore, renewable requirements may now not only apply to the power sector, but for buildings and heating in the future as well.

Funding and Financing

Regarding funding, it was highlighted that U.S. federal and state governments do not fund directly, but support think tanks and foundations (such as the NRDC). As such, European countries, and private foundations may be able to invest in China and Chinese NGOs, particularly as they can advance their work on renewable energy and emissions reduction at a time when President Trump is reducing emphasis on renewables in the U.S. An issue with this could be the Chinese government's new NGO law, which may restrict funding, and there have been cases in which funding has been

directly rejected by banks. However, the areas usually affected by this involved providing services to government departments, therefore funding hopefully would be supported.

Whilst there is plenty of room for U.S. states to cooperate, panellists mentioned that states are limited to supporting technology, as they cannot fill the role of federal funding which will be heavily cut. Instead, NGOs are encouraged to act internationally, and the promotion of sustainability and renewable energy should be fought for in all spheres, including through media and legal avenues. Despite funding issues there is a lot of will to implement meaningful change. Recent years have seen a focus on implementation at the city level, with many cities setting targets to meet the national government goal of peaking emissions by 2030. Furthermore, Shenzhen has already signed multiple cooperation agreements with California in relation to carbon trading.

It is notable that federal government decisions do have a definite negative effect on states and cities, as evidenced by the cancelling of the low-carbon summits focussing on cities. However, it is anticipated that China will convince the U.S. to not interfere in city-level efforts to reduce emissions.

The panel discussed China's strong green finance frameworks across seven ministries, and of China's role in establishing the G20 green finance task force. Current project areas include energy finance, and combatting the difficulties faced by energy services companies regarding transitional financing channels, due to the risks from bankers' perspectives. China can learn from the U.S., where the government has set up programs to support financing private capital into building energy efficiency retrofitting. China has already made progress in this area, and is active in promoting green finance. It also wants to collaborate internationally on carbon capture, utilization and storage (CCUS), however is still only in the demonstration phase, and deployment is several years away.

Whilst the concept for green finance is good, the practicalities still need to be developed. The CCUS should be an area where cooperation between China and the U.S. should be able to continue, particularly in light of the G20 in Germany. To make it viable, however, there is a need for a strong carbon price and support from government.

There is also a need for a risk management system to guarantee that investment is under control. This should include tools available to both parties. The U.S. has good tools for risk management that China can borrow.

Research and Technology

Moving forwards, climate change research and technology provide an innovative and exciting area for cooperation. Areas of significance to the panellists' discussions included: electric vehicle charging, on which the US has conducted many pilots and would be able to help China to develop further; policy, technology and social sciences education; and renewable energy, where China has overtaken the U.S. in terms of capacity, but the U.S. provides successful case-studies in integrating policy, markets and technology.

The U.S. and China are the top two countries for renewable energy capacity, and China's position as the largest manufacturer of electric cars was raised. Transport is a promising area, with the potential to reduce oil consumption through the development of electric cars. Asian demand for solar power and electric vehicles were identified as the biggest market driver. Despite a lack of encouraging

policy in the U.S., there will still be American interest in the market, and the signing of bilateral contracts, and for companies to generate electricity for their own use, should be encouraged.

Another important area of cooperation mentioned was material science, which is a major field of research within the U.S., and can make significant contributions to solar and buildings materials. Many Chinese stakeholders are conducting research in this field in the U.S., and revolutionary materials such as Pyrovskite have been developed for use in building-integrated solar. Stanford and the University of Colorado have been researching thin films to coat industrial equipment and/ or buildings with, to reduce heat absorption and reflect light from buildings rather than convert it into heat.

Businesses are being encouraged to monitor their emissions and energy use, and data-disclosure technology is very advanced in the U.S. The panel encouraged China to work on data-disclosure technology, particularly in relation to transportation emissions. Disclosure should include energy consumption, renewables utilisation and grid-integration. China is also encouraged to research in its services field, such as transportation of goods to the U.S. Future discussions are thought to include the shared-bike model, which China has pioneered; heat pumps, on which China has also conducted significant research; and the manufacturing of batteries.

The U.S. is a research and development leader for technology, and it is thought that universities such as MIT will be able to take a lead in energy development, even without federal support. Many of these technologies can be subsidized by other countries in order to get them to scale, and China can continue to dominate the manufacturing aspects. Improved speed of basic lab research would be extremely useful.

Panellists encouraged information disclosure, and suggested that China introduce a program similar to the United States' Energy Star Program, which is promoted by both government departments and the private sector. The program is split into two types of tools: research level, and practical-level tools which can be used by building owners to know where to improve the energy-efficiency of buildings. Utilizing these tools within policy making would help to improve energy-efficiency in the building sector, and bring benefits both within the U.S. and China. It is suggested that fieldwork and the application of theories from the ground up would lead to important exchanges and dialogues between end users and stakeholders, which would make research more accessible and useful to the community. Apprehending issues and considering best-practices from other sectors would also be beneficial to the building sector, through knowledge-sharing.

Emissions reduction

EDF has been working with power sector in China on emissions trading for a long time. The current goal is to help decarbonize China's power sector in the most efficient manner. Traditional pollutants from coal fired power plants like SO_2 and NO_x emissions have been significantly reduced through state of art control technologies, and are no longer the major issue in power sector development. Super-low emissions standards have been applied in China's power sector, resulting in about 1/3 of coal-fired plants reaching emission levels as low as natural gas plants. GHG emissions are now the major concern in the power sector. There are four pathways for the power sector to reduce carbon emissions: through technological improvements; through restructuring the power sector by using

more renewable energy; through demand-side management, by reducing consumption; and through the carbon market. The latter three could be more effective than technology upgrades in terms of GHG reduction for the power sector. Projects have been underway together with the China Electricity Council, and major power companies on power sector carbon trading, and DSM research. Collaborative measures should be considered between the carbon market and the power market to facilitate renewable energy integration , and to achieve low-carbon development.

The Clean Energy Research Centre (CERC) facilitates a collaborative project between the U.S. and China. One of its projects recently survived funding cuts because it had the most involvement with private enterprise. The LBNL China Energy Group has Chinese counterparts for all projects, and brings companies from the U.S. to understand the Chinese market. Despite the federal government's political stance, Jerry Brown and California have shown a great deal of drive towards renewables, and private-level engagement has increased. For example, companies are travelling across countries to look for projects and technology in the U.S., and markets for new technologies in China.

At the Clean Energy Ministerial Conference in Beijing in June, Brown signed several agreements, including with Qidi group and Haidian District to implement technology developed in California. There has also been cooperation between the University of California, Qidi Group and Tsinghua. Brown wishes to see more Chinese investment going into clean energy in California. The National Development and Reform Commission (NDRC) and trade organisations have held discussions regarding setting up a base in Berkeley to be able to send member companies to learn and converse with U.S. companies. Fields of interest include technology, IT, and energy and environment from the business perspective of non-traditional energy companies such as Baidu and Alibaba.

Natural gas is an area of opportunity, especially the liquefied natural gas market which makes natural gas a fungible trading commodity. Efforts to replace coal heating in rural areas with natural gas will provide major investment opportunities for the U.S. Shale gas and shale oil are areas for great cooperative potential between the U.S. and China, with the latter able to learn about environment mitigation and the negative effects fracking has on groundwater. NRDC is currently working with the Ministry of Environmental Protection (MEP) on policy.

China's oil and gas sector is currently dominated by the three giants, with big oil companies such as CNPC having already established their place. In this setting, Chinese shale gas companies will develop slowly in a non-competitive way. It was suggested that marketizing shale gas would be beneficial, as has been done in the U.S., which has an energy sector which is open for bids in the downstream natural gas and oil market. China can work with the U.S. on its extraction technology and tap into its shale gas reserves.

There is Chinese interest in the electrification of ports, and L.A. in particular, mainly on ship-to-shore technology. This is a potential area for cooperation, to tackle the current Chinese infrastructure which is highly polluting and includes the use of dredge trucks. Diesel pollution is a major part of urban pollution in China. Therefore, electrifying ports with batteries and overhead cables is a major opportunity through which the U.S., China and Europe could easily cooperate.

Exchanges regarding carbon markets have been underway, including study tours of Chinese officials to California and the RGGI states, and officials from California have visited China for carbon trading

workshops. There has been no federal-level carbon trading occurring in the U.S., but there are regional carbon trading markets. Exchanges have been taking place for Chinese policy makers and companies to visit the U.S., and interest has been increasing over recent years. The U.S. views China as a huge market for low-carbon technology, and the exchange of information is predicted to increase despite President Trump's stance, as many officials who disagree with his policies have left government roles and are engaging with China in other ways.