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MUTUAL LEARNING IN ASIA'S ENERGY TRANSITION

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1. INTRODUCTION: SOUTHEAST ASIA'S INESCAPABLE ENERGY TRANSITION

The energy transition is now considered a necessity to move towards sustainable development and to improve living standards. This is especially the case in South East Asia where energy demand is expected to increase by 50% and electricity demand to double by 2025. The region has not enough fossil fuels to cope with this growing demand and will have to increase its imports which may endanger its energy security (IRENA and ACE, 2016). Other critical issues are associated with an over-dependence on fossil fuels: risk of choking due to coal burning, Greenhouse Gas Emissions (GHG) accelerating climate change, city congestion and environmental damage. On top of that, the non-electrification rate now stands at 120 million people, in the ASEAN region out of a total population of 639 million, which means that nearly two out of ten people do not have access to electricity. The reason is poverty which makes energy too expensive and the huge cost of a national electricity grid which has to reach isolated inland areas and scattered islands in archipelago countries. In this context, energy transition must not be seen as an additional problem to resolve but as the solution to many of the issues described above and a source of new opportunities for economic development and well-being.

It is in the field of energy transition that mutual learning among Asian countries can pave the way for a common sustainable future. On October 2015, the 33rd ASEAN Ministers on Energy Meeting announced the ASEAN Plan of Action of Energy Cooperation (ACE 2015), a series of targets to reduce energy intensity by 30% in 2025 and to increase the region's share of renewables to 23% of the total primary energy supply (TPES). Additionally, ASEAN has signed the Paris Agreement which entered into force on 4 November 2016. The shared objective to keep climate change below 2 degrees Celsius implies a global decarbonised energy system between 2050 and 2070. ASEAN is committed to achieving the goals of the 2030 Agenda for Sustainable Development as well, which aims for universal access to energy by 2030 and reduced energy air pollution.

Yet, in 2016, renewables accounted for 12.4% of the total energy supply, (with hydropower included), up from 9.4% in 2014 (IRENA and ACE, 2016). This shows that Southeast Asian countries have a long way to go to really make progress in the energy transition. If current energy policies are pursued, renewable energy will account for

only 17% of 2025, 6% below the target (IRENA and ACE, 2016). To reach the 23% goal, a considerable effort must therefore be made by investing around US$ 27 billion annually in renewable energy capacity, up from US$ 3 million annually at present (IRENA and ACE, 2016, p 18). This huge increase of investment cannot be realised by South East Asian countries only. This is where China can make a positive contribution. China is committed to energy transition and is a leader in most of renewable energy technologies and markets. China has also promoted the Belt and Road Initiative (BRI) which includes energy production and transport as one of its core components. By developing a dialogue on energy transition and making it a key objective of the BRI, China and ASEAN can build a community of shared sustainable future.

2. DEVELOPING CLEAN ENERGY PROJECTS IN SOUTHEAST ASIA

Most of the ASEAN member states have already set their own objectives for renewable energy. Brunei targets 10% of power generation by 2035; Indonesia, 23% of TPES by 2025, 31% by 2030; Lao PDR aims at 30% of total energy consumption by 2035, excluding hydropower; Malaysia has a goal of 11% of power generation by 2030, excluding hydropower; Myanmar aims at 38% hydro and 9% non-hydropower by 2030-31; the Philippines aims at a production of 15.3 gigawatts by 2030; Singapore has a goal of 8% of electricity produced by solar panels; Thailand, an objective of 30% of final energy consumption; and Vietnam 12.5% by 2025 and 21% by 2030, excluding hydropower (Fuentes et al., 2018). To meet this challenge, the region has a huge potential, whether solar (abundant sunshine for about 12 hours day), wind (Thailand, the Philippines, Vietnam, and Indonesia), ocean, river, rain or geothermal (numerous volcanoes in the Philippines and Indonesia), which is at present largely untapped. Hydropower is the largest source of renewable energy so far. Laos, thanks to its hydropower resources, has the highest share of renewables in ASEAN at 18%, compared with 8 to 9% in Vietnam and the Philippines and less than 5% in other member states.

Several drivers of change can be identified. Firstly, business consumers, under pressure from public opinion, are helping to boost demand for renewable energy as testified by the establishment of RE100 in 2014 – a collaborative, global initiative uniting more than 100 influential businesses committed to 100 percent renewable energy- including companies like Google, Microsoft, Coca Cola and IKEA – all of which have a strong presence in ASEAN (Thomas, 2019a). Secondly, thanks to constant innovation, renewable energy is becoming cost-efficient and able to produce electricity at or below the cost of coal-based energy systems (IRENA and ACE, 2018, p 12). Renewables are now a profitable investment opportunity, providing that the feed-in tariffs are attractive to external investors (Fuentes et al., 2018, p 21).

Innovation is enlarging the array of available profitable options and is progressively tilting the balance of power towards renewables. Innovation like floating solar panels has promising potential in Southeast Asia and is already experienced in Singapore and Thailand (Thomas, 2019b). They can be installed in reservoirs or lakes created by dams so that their production capacities are enhanced, which can be of particular interest to countries like Laos which operates 46 hydropower stations. “At some large

hydropower plants, covering just three to four per cent of the reservoir with floating solar could double the capacity of the plant" (Thomas, 2019b). In periods of drought, floating solar panels can be used in priority to produce electricity and save water. They equally drastically reduce evaporation and prevent algae blooms. They can be used on the coasts of archipelago countries like the Philippines and Indonesia and in inland areas where they can save land for agricultural use.

The potential of these innovations will be reinforced by progress in the ASEAN Power Grid (AGP) (Gnanasagaran, 2018a). Since 1997, ASEAN member states are working together to link up national power networks with cross-border power interconnectors. Such integration of networks was not developed to integrate more renewable energy in the power grid, but it improves its economic viability because it resolves one of its main issues: the instability of production due to the variation of wind and solar radiation. Additional advantages are listed by Silitonga (2018): "The APG could reduce energy prices, mitigate supply shortages and power shocks, incentivise further market integration, and manage regional and subregional resource endowment differences". However, developments in power grid integration have been slow. In 2016, 12 cross-border connections had been achieved, out of 46 initially planned (Cornot-Gandolphe, 2017). Fortunately, renewables won't have to wait for the completion of the AGP to become viable. To stabilise the energy supply with renewable energy, improvements in battery-based energy storage are providing an alternative to large grid integration. This alternative is so credible that the World Bank is committed to investing US$ 1 billion in a new global program to accelerate the use of battery storage for energy systems in developing and middle-income countries. It even expects to mobilise up to US$ 4 billion (World Bank, 2018). More, batteries will overcome one of the main obstacles to universal access to energy, which is the isolation of some rural areas and islands in archipelago states. Batteries make feasible the development of isolated grids or micro-grid projects, "which are standalone grids involved in small-scale power generation" (Gnanasagaran, 2018b) supplied by local wind or solar energy.

Energy-storage batteries will benefit from the rise of electric vehicles in South East Asia. The total number of electric two-to-three wheelers is expected to reach 59 million by 2025 (IRENA and ACE, 2016). Four-wheel battery-electric vehicles will amount to 5.9 million, and there will be three million plug-in hybrids for a total of 8.9 million electric four-wheel vehicles (IRENA and ACE, 2016). Such an increase will lead to economies of scale and drive down the price of batteries, which will have a better energy density and longevity. Energy-storage batteries for homes and microgrids will benefit from these improvements and increase the share of renewables in TPES. ASEAN vehicle producers, like Thailand, Malaysia, Indonesia and Vietnam should reap benefits from the supply side and not exclusively from the demand side.

This double advantage is not confined to the automobile industry and extends to the production of renewable energy technologies themselves. Malaysia is the world's third-largest producer of PV cells and modules. It has an industrial base in solar technology production of some 250 companies involved in all aspects of the technology. The Philippines is similarly going big into solar energy production. Renewables can be a key element of national development policies and have the

potential to create many jobs. However, there are some challenges to overcome: The projects must be sufficiently profitable and bankable to guarantee adequate finance can be raised.

China has a critical role to play to help reduce the cost of these innovations and ease their widespread adoption by ASEAN countries by providing the necessary funding. The Belt and Road Initiative can be mobilised in this sense.

3. CHINA'S CONTRIBUTION TO A GREEN SOUTH EAST ASIA.

China is trying to rebalance its economy in favour of its domestic market and attempts to move to a service-led economy less energy-intensive. Due to the sheer size of China's economy, this trend has a strong influence on global energy markets and the cost efficiency of renewable energy. China has one-third of the world's wind power, a quarter of its solar capacity, six of the top ten solar-panel manufacturers and four of the top ten wind-turbine makers. It sells more electric vehicles than the rest of the world combined (IEA, 2017). It has spent more on cleaning up its energy system than America and the EU combined (The Economist, 2018).

The current renewable energy surge is due largely to booming solar panel deployment in China and throughout the world. It grew by 50 per cent to around 74 gigawatts, according to the international energy agency (IEA, 2017). It has led to a fall in the cost of electricity produced by solar energy compared to coal to the point that solar power will achieve grid parity with coal in 11 of China's 31 provincial-level administrative units in 2019, four years ahead of an official target of 2023. It allows the sector to continue its rapid expansion despite the slashing of government subsidies in June 2018 (Johnson, 2019). The wind is set to reach grid parity in China in 2020.

China is also the world leader in the production of batteries. In 2017, seven of the top ten world lithium-ion battery makers were Chinese, among them BYD and CATL, which are engaged in capacity expansion drives. According to projections by Bloomberg New Energy Finance, China will produce 70% of the world's electric-vehicle batteries by 2021. Foreign producers like Tesla, Panasonic and LG Chem are investing in China to install Gigafactories able to produce car and storage batteries for the Chinese market and the rest of Asia (Tanaka et al., 2019). This drive leads to a fall in unit costs from around $1,000 a kilowatt-hour in 2010 to around $130-200 in 2016 for batteries which have a much higher energy density and longevity (The Economist, 2017).

The limitation of these improvements is that they largely depend on state subsidies. Renewable energy, batteries and electric vehicles' initial success in China were triggered by huge subsidies that weigh on public finance. The 1.25 million electric vehicles sold in China in 2018 are said to have cost $14.8 billion in subsidies (Kawase, 2019). Their recent phasing out tests the viability and survival of even the big players like BYD, CATL, BAIC BluePark and NIO which are producers of electric vehicles or batteries and sometimes both. This creates uncertainty about the near future of the electric vehicle market, although, in the long term, success is more assured.

The solution is to play on all the markets linked to battery usage, electric vehicles, consumer electronics and stationary storage fuelled, whenever possible, by renewable energy. Two additional emerging markets are making batteries a key investment for the future.

"Behind-the-meter" applications selling surplus capacity when electricity prices are high and buying when they are low, or managing peak power demand, are turning into the most attractive part of the electricity market. Tesla and other big battery-makers, carmakers and utility companies are investing big in this new market.

Autonomy and sharing in transport are the second opportunity to enlarge the range of applications of electrification. Three Chinese internet giants, Alibaba, Baidu and Tencent, are managing a vast array of investments in autonomous cars, mobility applications, and electric vehicles (The Economist, 2019). China is the world's largest market for rides ordered from a smartphone and Alibaba and Tencent are investors in Didi Chuxing, the world's biggest ride-sharing company, dwarfing Uber with 550 million users. Among many initiatives, Didi has formed a joint venture with BAIC to provide drivers who look to offer ride services with "new energy" vehicles including electric cars and plug-in hybrids. They can use a smartphone application to obtain a car loan, lease a car and connect to charging and maintenance services (Tabeta S., 2019). This is the last development of a broader global alliance announced by Didi in April 2018 to develop a custom fleet of low-cost electric vehicles. The alliance includes 31 global companies, among them European, Japanese, South Korean and Chinese car and battery makers (Tabeta, 2018). Didi's competitors are not standing idly by. Baidu and Tencent are also investors in NIO, a Chinese electric carmaker. Alibaba and Tencent have also invested in electric rentable bikes. The value of these markets is not only the mobility they provide but also the value of the data they provide. Baidu and Tencent are also investing in autonomous vehicles such as robotaxis and driverless shuttles. In summary, the sharing economy provides many additional opportunities to make energy transition possible.

CONCLUSION

China possesses many advantages which have the potential to ease the energy transition in China and Southeast Asia. It is at the edge of innovation in green and clean technologies. It has global companies that have accumulated a huge experience in cost-effective projects in renewable energies. It also has the companies and technologies to harness the additional benefits of the shared economy which can ease the energy transition. These assets should be used to promote more actively the "Green Belt and Road" which is part of China's policy as testified by the publication in May 2017, of the "Guidance on Promoting Green Belt and Road," "Belt and Road Ecological and Environmental Cooperation Plan," and "Vision and Actions on Energy Cooperation in Jointly Building Silk Road Economic Belt and 21st-Century Maritime Silk Road,". These documents emphasise that its investment in energy projects will be used to promote the Paris Agreement and 2030 Sustainable Development Goals and are motivated by the need to "share the ecological civilization philosophy and achieve

sustainable development." One way is to measure the progress made in the promotion of the energy transition would be to publish indicators showing how many projects in renewable energy are financed by the BRI in Southeast Asia and what is their importance about fossil fuels. BRI could also promote joint research and implementation of renewable energy projects involving Chinese and ASEAN countries' universities and companies. The China-ASEAN New & Renewable Energy Action Plan adopted in October 2013 could be the channel of this cooperation.

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