Julie de los Reyes
Center for Southeast Asian Studies, Kyoto University

The material foundations of a low-carbon transition

With decarbonisation, a new range of raw materials, with distinct power densities, geographical occurrence and/or spatial requisites will have to be mobilised to service energy demand. While previous transitions have been marked by a progressive move to higher density sources, a distinctive feature of the current transition is its reliance on resources that have lower power densities than its predecessors (Smil, 2015). The distribution, stability and geographical possibilities of renewable sources are also significantly different from fossil fuels. Resources such as wind and solar rely on natural conditions to generate electricity, are variable in output, and are far more dispersed. These material characteristics are significant, since they imply fundamentally different arrangements to source and harness alternative forms of energy. Ongoing experiments to develop, source and deploy viable renewable substitutes are varied and place-contingent, as scholars have shown (see Kama, 2020, Bustos-Gallardo et al., 2021), pointing to the need to understand the different challenges and responses to transition and the differing impacts this has across geographical boundaries and scales.

For carbon-intensive but resource poor economies in the Asia Pacific, the push to shift to low-carbon sources revitalises concerns surrounding the security of future energy supplies to meet domestic energy needs. The economies of Japan, Singapore and South Korea have been built on raw materials access overseas (Bunker and Ciccantell, 2007) and nearly all of their energy needs depend on imported fossil fuels. Decarbonisation privileges, in contrast, the development of indigenous supplies. Solar, wind and run-of-river must be deployed closer to sites of consumption, and located in areas where the production potential is highest, that is, where the natural resource is (most) available. These locations are often remote, thus drawing in spaces that have previously not been part of the energy landscape. Efforts to establish long-distance transport of energy carriers such as hydrogen, which is being positioned as the low carbon 'fuel of the future' (Trencher and van der Heijden, 2019: 210), is also leading to the revaluation of resources such as lignite, that were previously considered too low-grade, unstable (e.g. to transport), or inefficient to burn, but which are now prized for their hydrogen content (Hancock and Ralph, 2021).

The low carbon economy, in this sense, is constitutive of new materials, new territories and is premised on the creation of a new resource periphery. This makes access to and control of these new spaces and resources a strategic concern. As studies have shown, rural territories have been sites of friction, often revolving around competing land uses (e.g. for fuel or food production) (Borras Jr and Franco, 2012, Yenneti et al., 2016). 'Green grabbing' — the appropriation of land and resources for environmental purposes — is occurring across a wide range of places globally (Fairhead et al., 2012, Holmes, 2014). In South and Southeast Asia, the combination of growing energy demand, the availability of large tracts of contiguous land, ample solar radiation, lack of formal land titles (for farmers, indigenous communities), and/or concentration of land ownership (a legacy of colonial rule) created fertile ground for hosting renewable projects like solar. This was the case in the Negros Islands of the Philippines, the solar capital of the country, where land concentration — in the hands of sugar barons — allowed investors to swiftly negotiate and secure land access for large-scale solar farms. Research on energy transition in the so-called 'resource periphery', i.e. Latin America and Southeast

Asia, should thus critically examine the multi-scalar re-configurations and patterns of uneven development that are emerging with the transition to low-carbon sources, and the extent to which these reinforce existing (or generate new) inequalities.

Financing the transition

To date, little is known as to what drives investment and disinvestment trends in non-traditional market economies. This is especially crucial to unpack given the importance of the three largest East Asian economies, China, Japan, and South Korea, in the financing of energy infrastructure projects globally. They were among the largest sources of demand for coal, oil and gas, with active involvement in both upstream (exploration and mining) and downstream (power plant development) operations abroad (Makhijani, 2014, Lee and Woo, 2020). Since 2013, for example, they have been responsible for 95 percent of the total overseas financing for coal-fired power projects globally (World Resource Institute, 2021). Ironically, they are also positioned to be some of the largest funders of renewable projects, especially following recent pledges to support a 'green recovery' to counter the effects of the pandemic by supporting the development of green industries.

The actors involved in the financing of renewable and fossil fuel projects are highly diverse, with differing motives, investment horizons, and return requirements (Hall et al., 2017, Cojoianu et al., 2021). While private sources such as stock markets and banks the key funding institutions in the West have their counterparts in the East Asian financial landscape, and the financial centres of Beijing, Shanghai, and Tokyo have grown in size and significance in global financial markets over the past decades as economic geographers attest (Zhao et al., 2004, Wang, 2019), state actors and institutions still remain highly influential in 'steering' business activities in these economies (albeit variations exist in terms of degree of intervention and control). States exercise allocative power over energy projects and related investments through state-owned banks and development financial institutions, but also indirectly shape private sector investments through policy support. As scholars have noted, the dominant business models are characterised by close integration between typically large and diversified industrial firms, financial institutions and the state, which result to different risk perceptions, and distinct and usually more varied strategies in investing (Bhattacharya and Kojima, 2012, Jiang, 2019, Zhao, 2019). For instance, Japanese general trading companies (*sōgō shōsha)* that are among the top players in energy markets have benefitted from ready access to credit by financial institutions who 'strongly perceive the support of business activities for Japanese industry as a core responsibility' (Trencher et al., 2020: 10), while state support help de-risk large capital investments required to carry out business activities outside of their home country (Chen et al., 2020). A fuller understanding, however, is required as to how these differences i.e. place-specific institutional norms and state-market configurations impact the spatio-temporal profile of energy investments and, importantly, the pace and scale of transition. Indeed, East Asian economies have taken great leaps in energy investments that were deemed 'paradoxical' (Behling et al., 2015) but which resulted to some of the most remarkable advances in technological development and deployment of renewable energy in recent years.

* Notes are based on an upcoming publication: de los Reyes, J.A. 'Energy and resource geographies: Progress, challenges and future directions', in Hall, S. and Johns, J. (eds.), *Contemporary Economic Geographies: Inspiring, Critical and Plural Perspectives.* UK: Bristol University Press.

Bibliography

BEHLING, N., WILLIAMS, M. C. & MANAGI, S. 2015. Fuel cells and the hydrogen revolution: Analysis of a strategic plan in Japan. *Economic Analysis and Policy,* 48**,** 204-221.

BHATTACHARYA, A. & KOJIMA, S. 2012. Power sector investment risk and renewable energy: A Japanese case study using portfolio risk optimization method. *Energy Policy,* 40**,** 69-80.

BORRAS JR, S. M. & FRANCO, J. C. 2012. Global land grabbing and trajectories of agrarian change: A preliminary analysis. *Journal of agrarian change,* 12**,** 34-59.

BUNKER, S. G. & CICCANTELL, P. S. 2007. East Asia and the global economy: Japan's ascent, with implications for China's future, JHU Press.

BUSTOS-GALLARDO, B., BRIDGE, G. & PRIETO, M. 2021. Harvesting Lithium: water, brine and the industrial dynamics of production in the Salar de Atacama. *Geoforum,* 119**,** 177-189.

CHEN, X., GALLAGHER, K. P. & MAUZERALL, D. L. 2020. Chinese overseas development financing of electric power generation: A comparative analysis. *One Earth,* 3**,** 491-503.

COJOIANU, T. F., ASCUI, F., CLARK, G. L., HOEPNER, A. G. & WÓJCIK, D. 2021. Does the fossil fuel divestment movement impact new oil and gas fundraising? *Journal of Economic Geography,* 21**,** 141-164.

FAIRHEAD, J., LEACH, M. & SCOONES, I. 2012. Green Grabbing: a new appropriation of nature? *Journal of Peasant Studies,* 39**,** 237-261.

HALL, S., FOXON, T. J. & BOLTON, R. 2017. Investing in low-carbon transitions: energy finance as an adaptive market. *Climate Policy,* 17**,** 280-298.

HANCOCK, L. & RALPH, N. 2021. A framework for assessing fossil fuel 'retrofit' hydrogen exports: Security-justice implications of Australia's coal-generated hydrogen exports to Japan. *Energy,* 223**,** 119938.

HOLMES, G. 2014. What is a land grab? Exploring green grabs, conservation, and private protected areas in southern Chile. *The Journal of Peasant Studies,* 41**,** 547-567.

JIANG, Y. 2019. Competitive partners in development financing: China and Japan expanding overseas infrastructure investment. *The Pacific Review,* 32**,** 778-808.

KAMA, K. 2020. Resource-making controversies: Knowledge, anticipatory politics and economization of unconventional fossil fuels. *Progress in Human Geography,* 44**,** 333-356.

LEE, J.-H. & WOO, J. 2020. Green New Deal Policy of South Korea: Policy Innovation for a Sustainability Transition. *Sustainability,* 12**,** 10191.

MAKHIJANI, S. 2014. *Fossil fuel exploration subsidies: Japan* [Online]. ODI and Oil Change International. Available: http://cdn-odi-production.s3.amazonaws.com/media/documents/9270.pdf [Accessed].

SMIL, V. 2015. Power density: a key to understanding energy sources and uses, MIT press.

TRENCHER, G., DOWNIE, C., HASEGAWA, K. & ASUKA, J. 2020. Divestment trends in Japan's international coal businesses. *Renewable and Sustainable Energy Reviews,* 124**,** 109779.

TRENCHER, G. & VAN DER HEIJDEN, J. 2019. Contradictory but also complementary: National and local imaginaries in Japan and Fukushima around transitions to hydrogen and renewables. *Energy Research & Social Science,* 49**,** 209-218.

WANG, X. 2019. The Dynamics and Governmental Policies of Shanghai's International Financial Center Formation: A Financial Geography Perspective. *The Professional Geographer,* 71**,** 331-341.

YENNETI, K., DAY, R. & GOLUBCHIKOV, O. 2016. Spatial justice and the land politics of renewables: Dispossessing vulnerable communities through solar energy mega-projects. *Geoforum,* 76**,** 90-99.

ZHAO, H. 2019. China Japan Compete for Infrastructure Investment in Southeast Asia: Geopolitical Rivalry or Healthy Competition? *Journal of Contemporary China,* 28**,** 558-574.
ZHAO, S. X., ZHANG, L. & WANG, D. T. 2004. Determining factors of the development of a national financial center: the case of China. *Geoforum,* 35**,** 577-592.