Governing Low-Carbon Innovation – Demand not just Supply

The urgent, global imperative for developing low-carbon societies calls for significant investment by governments and corporations in many new kinds of engineering, economic and social innovation. This is important in itself with regard to minimising future global temperature increases and as a way of developing leadership in industries likely to be crucial within this new century.

But investment in, and support of, what? Answering this key question calls for **a major shift in emphasis from supply-side considerations that currently dominate to issues of 'demand'**.

Drawing on ongoing research regarding low-carbon innovation China, this Policy Brief makes two points regarding demand in the context of low-carbon system transition:

1) **Demand is particularly important if currently neglected** as both a source of major opportunities for expedited transition, and as crucial for the successful and rapid adoption of low-carbon 'technologies'
2) **Existing sources of demand are in need of support and development** since the broader social factors that constitute 'demand' are rapidly changing and often in uncertain directions.

Together, these insights lead to strong recommendations of more concerted efforts to work with and support existing and spontaneous bottom-up demand for low-carbon innovations.

These conclusions follow from our programme of research on a number of low-carbon industries in China already characterised by strong demand, both domestically and for export.

1) **Demand is particularly important, if currently neglected**

- *Demand is crucial for (low-carbon) innovation capacity.*

High international demand for Chinese solar PV products underpins the greater innovation capacity and technical competitiveness of this industry compared to Chinese wind power, which is more domestically-oriented and dependent on government procurement. Research from Tsinghua School of Public Policy and Management/ China Institute of Science and Technology Policy, using patent mapping and patent citation analysis across multiple national patent offices, shows how **it is the spontaneous bottom-up demand for solar PV that makes this a more competitive industry**. And this in turn propels a stronger innovation capacity, including in the sector's most advanced technologies. Hence there are several Chinese firms in the 5 most competitive and innovative globally in this industry. By contrast, in wind power Chinese firms do not rank so highly and focus their innovation efforts in less technologically challenging domains.

- *Demand is crucial for massive, rapid adoption of (low-carbon) innovations.*

Turning to domestic demand, consider lessons from solar thermal (Urban et al. 2014) and electric two-wheelers (E2Ws) in China (Tyfield et al. 2014). Both are massive, bottom-up indigenous innovation successes, with success primarily based on spontaneous, unsubsidised demand. China's solar thermal sector is based on indigenous patented technology and with installed capacity of solar water heaters at 260GW in 2015, creating a large saving in GHG emissions and a globally-leading industry in a new sector. E2Ws meanwhile number over 200 million in what is again a new market dominated by Chinese brands, technologies and demand.

In both cases, there are also significant opportunities for further growth, both domestic and export, and for development contributing to low-carbon transition: solar thermal is already developing into space heating, for instance, while the E2W market is also diversifying in ways that could revolutionize urban mobility options away from high-energy, high-congestion car-based systems. In both cases **these low-carbon innovations have become robust and growing industries primarily by serving the high demand within China**. This contrasts with other low-carbon technologies that have struggled to take off, despite significant government support, such as electric cars.

- *Demand substantially allays objections to support for existing 'lower-tech' domestic successes in China*

There are, of course, also challenges for solar thermal and E2Ws. Both remain comparatively low-tech industries producing goods not at the technological cutting-edge. This raises questions about how important they are to China's future global competitiveness and innovation capacity, and how significant their products will be to consumers as they become more prosperous. However, lessons from the export demand for solar PV answer these objections.

First, there is also considerable untapped export demand for both solar thermal and E2Ws, both across the global south and even in richer markets (especially amidst 'secular stagnation'). Secondly, both domestic and export demand stimulates competition and dynamic innovation. Hence what may currently be lower-tech and/or lower-quality products and brands will not necessarily remain so. Finally, the growing spending power and changing tastes of Chinese consumers will evolve in parallel with improvement in these sectors. Accordingly, **these sources of domestic demand could easily converge with the global cutting-edge. They are major opportunities for developing globally-leading Chinese brands and markets.**

2) **Existing sources of demand themselves need support and development**

This leads to our second point: that demand also needs support. Demand is necessary but not sufficient for system transition and the development of globally-leading new low-carbon markets and industries.

This is because 'demand' is not just an economic but a social and cultural process based in rapidly changing lives, identities and institutions underpinning ability and willingness to pay and/or invest in something. **This is dynamic, and existing sources of demand provide opportunities that may pass.** If this demand is not enabled, or even penalized, many people may well move away from the social and cultural positions underpinning it and the industries serving these positions will struggle. Conversely, if judiciously supported, these industries could in turn not just grow but shape the sources of their demand in productive positive feedback loops that would generate a prosperous, low-carbon and highly innovative society.

In short, a focus on demand for low-carbon innovations, not the supply of low-carbon technologies, provides the greatest opportunities for policy and business strategy in China and elsewhere.

READ MORE:

Tyfield, D., Zuev, D., Li, P. and Urry, J. 2014. *Low-Carbon Innovation in Chinese Urban Mobility: Prospects, Politics and Practices.* Brighton: STEPS Working Paper 71. Available at: http://steps-centre.org/publication/low-carbon-innovation-chinese-urban-mobility-prospects-politics-practices/

Urban, F. and Geall, S. 2014. *Pathways Towards Renewable Energy in China: Prospects, Politics and Practices.* Brighton: STEPS Centre Working Paper 70. Available at: http://steps-centre.org/publication/pathways-towards-renewable-energy-china-prospects-politics-practices/

Zhou, Y., Pan, M., Urban, F. 2016. Comparing the global knowledge positions of China's wind and photovoltaic industries: patent portfolios, networks, and international couplings. Working paper.

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For more information please visit: steps-centre.org/project/low-carbon-china/