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STEPS centre

ISSC 'Transformations to Sustainability' Programme Concept Note

Low-carbon energy transitions that meet the needs of the poor in China

Introduction

Beijing Normal University is a member of the 'Constructing Pathways to Sustainability' network, led by the STEPS Centre at the University of Sussex. The network focuses on both understanding and constructing pathways to sustainability across three areas: water and waste in sustainable cities; low carbon energy transitions for the poor; and sustainable agricultural and food systems for healthy livelihoods. It draws on cutting-edge social science from Africa, Latin America, East and South Asia, Europe and North America, bringing together researchers and knowledge partners from across each region to learn across regions and disciplines in the broader search for transformations to sustainability.

Regional Co-Design Workshop at Beijing Normal University, 16th December 2014: "Low-carbon energy transitions that meet the needs of the poor"

The 'Constructing Pathways to Sustainability' network focuses on interdisciplinary integration, inclusive design, co-production and joint dissemination as core aspects of its work. We aim to engage knowledge partners and relevant actors (described above) at every stage in the project. The network received seed funding from the International Social Science Council (ISSC) to run regional workshops that explore specific sustainability challenges with key stakeholders. Beijing Normal University is focusing on the theme "Low-carbon energy transitions that meet the needs of the poor" and hosted a workshop on this theme on December 16, 2014, at Beijing Normal University, including academic researchers from a number of university departments and knowledge partners such as Greenovation Hub, Oxfam, chinadialogue and the China Foundation for Poverty Alleviation. The output of the workshop is this short concept note.

Importantly, Beijing Normal University's efforts have been paired with research of a similar nature in Africa. The African Centre for Technology Studies (ACTS), based in Nairobi, have also run a workshop in Kenya bringing together their own staff as well as regional actors such as the African Technology Policy Studies Network, Stockholm Environment Institute, STIPRO (Tanzania), Uganda National Council for Science and Technology, the Kenya Climate Innovation Centre, UNDP, Ministries, private sector representatives and the media.

Sustainability Challenge: Low-carbon energy transitions that meet the needs of the poor in China

China's past three decades of rapid economic growth have brought many out of poverty and expanded energy access considerably. China is today the world's largest energy consumer by volume (IEA 2013). But much of this expanded energy access has been achieved by burning coal: in 2012, around 76.5% of energy in China came from coal (China National Bureau of Statistics 2013), a highly polluting and carbon-intensive fuel. The period has therefore also seen grave costs to the environment and public health. A recent study by Chinese scientists found that smog caused by coal burning killed an estimated 670,000 people in China in 2012 (Li 2014). Beyond such striking, direct

effects on human health, China's energy mix lies at the core of a litany of interlocking health, environment and social challenges, from pressures on water supplies to worker safety – and, perhaps most prominently in the international arena, global climate change.

China is today the world's largest carbon dioxide emitter by volume (Netherlands Assessment Agency 2013), and in 2009, around 77% of China's greenhouse-gas emissions came from energy generation (World Resources Institute 2009). Climate change will have highly uncertain and potentially hazardous effects in China, particularly on energy, water and food security. For example, there is the potential for severe water shortages and more flooding disasters. Decades of export-oriented growth mean China's eastern seaboard cities are particularly vulnerable to climate change and sea-level rise, with warming potentially increasing the frequency and level of inundation in delta megacities, such as those in the Pearl River Delta, due to storm surges and floods from river drainage, potentially affecting residents and damaging critical infrastructure in heavily industrialised low-elevation coastal areas (McGranahan, Balk and Anderson 2007). These hazards – like many others, from desertification to water scarcity – are known to have uneven social effects and will disproportionately affect the poorest in society. Therefore, efforts to move China away from high-carbon energy pathways and towards large-scale low-carbon energy access are crucially important aspect of achieving a transition that addresses climate change and meets the needs of the poor.

Historical background

The STEPS Centre's pathways approach places great emphasis on the historical context in which pathways to sustainability (or otherwise) are situated. In China, a low-carbon energy transition will take place in the context of a long history of widely differing approaches to the governance of its environment and innovation systems, from the 1950s and 1960s – when numerous energy projects, such as hastily-built dams, proved inefficient and environmentally damaging (Shapiro 2001) – to China's embrace today of low-carbon innovation as a central aspect of government policy. China's Five-Year Plans continue to set the country's key strategic and economic priorities in the energy sector: in the first decades of the People's Republic, these targets tended to emphasize ever-higher production targets, yet in the past decade, such targets have been adjusted downwards and have also integrated energy efficiency, carbon intensity reduction targets and the development of non-fossil fuel sources of energy.

China's 12th Five Year Plan, from 2011 to 2015, has established seven 'strategic emerging industries' that receive dedicated state funding, increased access to private capital and preferential policies, which include new energy and energy conservation. However, the implementation of such targets is often unpredictable and uneven. China's policy-making at the elite level is characterised by bargaining between bureaucratic units, while the central government often lacks the capacity to demand enforcement of environmental laws and policies at the local level (Geall and Hilton 2014). However, governance of energy and the environment in China today has also opened to include a wider range of actors than in previous eras: not only have some officials and policymakers supported greater citizen oversight and public participation to address this enforcement challenge, but also environmental NGOs have proliferated and found ways to influence policy (Shapiro 2012).

Sustainable Alternatives

Renewable energy technologies, such as wind and solar energy, not only help to mitigate climate change by substituting for carbon-emitting fossil fuels, but also can in some circumstances provide cheap and reliable energy to areas where grid-based provision is unreliable or otherwise prohibited by geography or high costs. The increased efficiency and renewable nature of such lower carbon energy also can improve energy availability, which in turn helps to build energy security and economic resilience (Byrne, Ockwell et al 2014; xii). In China, this approach underpinned the early development of solar energy: the Brightness Programme, initiated in 1996, was China's first national policy use renewables to expand electricity access in remote areas of western China (Zhang et al 2014: 905). In 2002, the State Development Planning Commission launched the "Power Supply Plan

for Rural Areas without Electricity in the Western Provinces and Regions" policy, which encouraged the adoption of renewable energy technology, including solar photovoltaics (PV) and wind power generation, for household consumption by farmers and herdsmen in western regions lacking grid electrification (Sun et al 2014: 222).

However, from 2004 to 2008, China's solar PV policy shifted from an emphasis on expanding energy access for the poor to an "export-oriented growth stage" (Zhang et al 2014: 906), with the central government supporting a burgeoning solar export industry and investing in technology R&D, for example through "national level key laboratories", covering almost every link in the solar PV manufacturing chain. By 2011, around 90%-95% of solar PV modules were exported, mainly to Europe and the United States. Later, an overcapacity crisis and changes in policy overseas led to a renewed effort to create a domestic market for solar PV in China, with government programmes such as "Golden Sun" launched in 2009 to encourage the development of distributed solar PV. However, the industry still remains dominated by exports and large-scale ground-mounted installations, rather than the expansion of low-carbon energy that meets the needs of the poor.

By contrast, China's development and installation of solar water heaters has been the "undiscussed protagonist" of a transition from fossil fuels to low-carbon energy in China (Annini et al 2014). China's solar water heaters are predominantly produced for the domestic market, particularly in rural areas. In 2009, almost 65% of the world's installed solar water heater capacity was in China (REN21, 2011), and they are used by over 30 million households (CGTI, 2009). The sector – which has benefitted from strong provincial and local government support but little central regulation or policy support – has seen rapid development over the past 15 years (Liu et al 2010), including growth of around 20-25% each year between 2000 and 2010 (Hu et al, 2012), led primarily by their low cost and ease of installation for rural users seeking cheap and reliable access to hot water.

The ISSC workshop in Beijing, which convened academics, civil-society activists, donors and energy experts, identified the need to move away from technology-focused approaches to expanding energy access towards bottom-up approaches that also integrate concerns embodied a new central government focus on poverty reduction, seen for example in the State Council's new policies on rural participation. Key challenges for a low-carbon energy transition that serves the needs of the poor in China were identified. These include:

- grid connectivity, since certain policies, such as capacity-based subsidies, have driven the construction of renewable energy infrastructure without matching grid connectivity;
- property rights, since certain policies, such as solar PV Feed-In Tariffs, assume energy users own their own properties or roof-spaces;
- demand, considering the sheer scale of the challenge in the world's most populous countries;
- stark regional differences, which go beyond simply 'eastern' and 'western' China, with more granular social analysis revealing large differences between counties in richer provinces, for example;
- cost, where the promotion of solar electricity, for example, needs to better take into account the relatively large up-front cost of a PV module;
- gaps between top-down policy design and implementation, a frequent problem in China that suggests the need for better analysis and oversight;
- hidden environmental effects of purportedly clean technologies, such as silicon processing and purification for solar PV;
- natural disasters, and both the risks and opportunities for resilience that renewable energies could play in this regard;
- the need for greater advocacy from regional stakeholders, with the current dominance of technical and elite voices in the energy discussion;
- the need to involve the poor in low-carbon development, which is an increasingly technocratic domain for policy debate; and,

- the need for better social impact and evaluation of plans that aim to expand low-carbon energy access for the poor.

Pathways and Actors to be included in the Research and Engagement Activities

Green transformations, write Scoones, Newell and Leach (forthcoming), should be "both 'top-down', involving elite alliances between states and business, but also 'bottom-up', pushed by grassroots innovators and entrepreneurs, and part of wider mobilizations among civil society." Such an approach leads us to consider not only the pathways strongly supported by the Chinese central government in its Five Year Plans and by its major industrial partners, such as the development of the solar PV industry, but also the role of other actors – small firms, NGOs, foundations and international cooperation mechanisms, for example – and their potential to promote low-carbon energy access, through pathways such as solar thermal, that can meet the needs of the poor.

Convening a range of stakeholders, including government officials working in poverty alleviation, energy and governance of civil society, businesses working in renewable energy, media reporting on environmental and energy challenges, international development actors, helped to better appreciate those pathways to an energy transition that meets the needs of the poor, and the workshop in Beijing enabled some of these actors to come together and identify knowledge gaps and opportunities for constructing more sustainable pathways as part of the STEPS Centre-led network.

These knowledge gaps include: the role of pathways approaches and other non-technology-focused frameworks in the theoretical and practical formulation of approaches to energy transition and energy access among scholars, donors and practitioners in China, and the under-theorised potential role of NGOs, social enterprise and social innovation in energy transition in China. The group identified possible opportunities for future collaboration, in the form of an online group, seminars and discussion. Foundations such as the China Foundation for Poverty Alleviation expressed an interest in learning more from the pathways approach and learning from prior research on energy transitions that meet the needs of the poor in East Africa. The group also expressed an interest in designing a pilot study in a rural area of China, where the obstacles and opportunities for renewable energy development could be investigated in detail, with greater attention to the social and practical elements of energy transition, using methodologies from social science such as ethnography and backward mapping, rather than simply a technical or environmental focus.

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