



The Political Economy of State-led Energy Transformations: Lessons from Solar PV in Kenya and China

Dave Ockwell, Pete Newell, Sam Geall,
Kennedy Mbeva, Wei Shen and Adrian Ely

Energy Transformations

A large decorative graphic consisting of several thick, overlapping, curved lines in various shades of green and grey, sweeping across the bottom half of the cover.

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Amid talk of the need for a low carbon 'clean energy revolution' to address the challenges of energy poverty and climate change, there is growing academic and policy interest in understanding the role of key actors that are expected to enable transitions and transformations towards a low carbon economy in a pro-poor way. Within the socio-technical transitions literature, there has been increased interest in "the state" as the primary actor with the responsibility, authority and capacity to address these issues. But understanding the role of the state in energy transformations requires an appreciation of context: what is possible given enormous differences in capacity and resources, autonomy and uneven access to different energy sources and technologies. Which technologies and energy systems receive support, whose energy needs get prioritised and which actors are charged with the responsibility for meeting energy needs are a function of very different decision-making processes, political systems and political economies. Taking the case of support to solar PV in China and Kenya, we develop a political economy analysis of state-led energy transformations which seeks to explore how different aspects of statehood impact upon the nature and prospects of the sorts of transformations now urgently required of energy systems. We do so by examining political economy dynamics in relation to: (i) the organisation of the state; (ii) the political nature of the state; and (iii) the state in the global political economy. This raises questions about the viability and desirability of generic prescriptions for "managed transitions" in light of such diversity in state forms and functions, the different ways in which they interact with energy systems and the evident limits of the sorts of transitions and transformations that states alone can steer, manage or impose. It thus speaks to broader debates about the politics of "care" vs. "control" in transformations to sustainability.

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Contents

Acronyms.....	ii
Abstract	iii
1. Introduction.....	1
2. Aims, Approach and Intended Contributions.....	3
3. The Organisation of the State	6
3.1. Organisation of the State in China	6
3.2. Organisation of the State in Kenya.....	9
4. The Political Nature of the State	11
5. States in the Global Political Economy	15
6. Conclusions.....	20
References.....	21

Acronyms

CDM	Clean Development Mechanism
CPAD	State Council Leading Group Office of Poverty Alleviation and Development
DFID	Department for International Development
EU	European Union
FIT	Feed-In-Tariff
GIZ	[Deutsche] Gesellschaft für Internationale Zusammenarbeit ([German] Agency for International Development)
KEREA	Kenya Renewable Energy Association
MEP	Ministry of Energy and Petroleum
MOE	Ministry of Energy
NEA	National Energy Administration
NGO	Non Government Organisation
PRC	People's Republic of China
PV	Photovoltaic
REDP	Renewable Energy Development Project
SEPAP	Solar Energy for Poverty Alleviation Programme
SHS	Solar Home System
SNV	Netherlands Development Organisation
UN	United Nation's
UNFCCC	UN Framework Convention on Climate Change
US	United States (of America)
USAID	United States Agency for International Development

Abstract

Amid talk of the need for a low carbon 'clean energy revolution' to address the challenges of energy poverty and climate change, there is growing academic and policy interest in understanding the role of key actors that are expected to enable transitions and transformations towards a low carbon economy in a 'pro-poor' way. Within the socio-technical transitions literature there has been increased interest in 'the state' as the primary actor with the responsibility, authority and capacity to address these issues. But understanding the role of the state in energy transformations requires an appreciation of context: what is possible given enormous differences in capacity and resources, autonomy and uneven access to different energy sources and technologies. Which technologies and energy systems receive support, whose energy needs get prioritised and which actors are charged with the responsibility for meeting energy needs are a function of very different decision making processes, political systems and political economies. Taking the case of support to solar PV in China and Kenya, we develop a political economy analysis of state-led energy transformations which seeks to explore how different aspects of statehood impact upon the nature and prospects of the sorts of transformations now urgently required of energy systems. We do so by examining political economy dynamics in relation to: (i) the organisation of the state; (ii) the political nature of the state; and (iii) the state in the global political economy. This raises questions about the viability and desirability of generic prescriptions for 'managed transitions' in light of such diversity in state forms and functions, the different ways in which they interact with energy systems and the evident limits of the sorts of transitions and transformations that states alone can steer, manage or impose. It thus speaks to broader debates about the politics of 'care' versus 'control' in transformations to sustainability (Stirling 2014, Stirling 2011).

1. Introduction

The Paris Climate Agreement and various other international efforts (for example the Sustainable Development Goals) require that several trillion dollars of new funding for climate technology transfer to developing countries be mobilised in the next few years. Much of this is framed around what might be considered 'transformative' ambitions, for example the United Nation's (UN) aim of providing sustainable energy for the 1.2 billion people that currently lack access to electricity by 2030 and the aims under the Paris Agreement to avoid more than two degrees of global warming. Across all of this there is an implicit assumption that state intervention (whether at international or national levels) can somehow manage these transformations in low carbon and pro-poor directions. In this paper we seek to contribute to emerging discussions within the socio-technical transitions literature around the politics of transitions and, more specifically, the role and nature of the state within these politics. Our analysis speaks directly to contemporary critiques of prescriptions for 'managed transitions' (Stirling 2014; Stirling 2011), with their implicit assumption that a monolithic state-like entity might exist through which the prescribed actions necessary for transitions might be put in place, in order to effect some form of, '[...] seemingly amorphous, singular, depoliticized "way forward".' (Stirling 2014: 5). These assumptions are built into international treaties like the Paris Agreement about the role of states, as well many national transition plans, visions and strategies which envisage a top-down process of state-led energy transformation, one which sits awkwardly with the historical experience to date of the practice of energy transitions (Newell 2015).

In this paper we focus on low carbon energy technologies in relation to the above mentioned international policy context (with a specific focus on solar PV), technologies that it is suggested will be central to how such transformative changes might be achieved. Policy approaches that have attempted such transformative ambitions to date (for example the Clean Development Mechanism (CDM) under the UN Framework Convention on Climate Change (UNFCCC)) have tended (and continue) to frame the issue as two dimensional, consisting solely of a need for more finance for energy technology hardware. This two-dimensional focus has been reflected within scholarly work on energy and international development which exhibits a predominance of work from engineering and economics, with very little on the socio-cultural or political dimensions of the problem (Watson *et al.* 2012; Ockwell and Byrne 2016). This two-dimensional, 'hardware financing', policy approach has met with limited success, particularly in low and middle income countries. For example, by 2016 Africa as a whole (including South Africa and the countries of North Africa) had received only three per cent of accumulated international investment under the CDM. If new international policy efforts and spending are to avoid further reinforcement of existing structural inequalities and deliver meaningfully against the need of poor countries and poor and marginalised women and men therein, there is an urgent need for more sophisticated accounts of how energy transitions can (or cannot) be supported through deliberate interventions through public policy. In sum, a gap currently exists between expectations and assumptions about the role of the state, technology transfer, and the nature of finance and markets in international agreements and policy prescriptions and the ways in which transitions are actually unfolding in practice in different parts of the world (Newell and Bulkeley 2016).

One area of scholarly work which goes beyond the existing two-dimensional perspective on energy transitions is the field of socio-technical transitions, a field previously developed through attention mostly to post-war European contexts, but one that has begun to be explored through application in developing country contexts (Ulsrud *et al.* 2011; Ulsrud *et al.* 2015; Tyfield *et al.* 2015; Ahlborg and Sjöstedt 2015; Ockwell and Byrne 2016; Rolffs *et al.* 2015; Baker *et al.* 2014; Power *et al.* 2016; Newell and Mulvaney 2013; Newell and Phillips 2016). Whilst a socio-technical transitions perspective brings some socio-cultural and evolutionary dimensions of energy transitions to the fore, increasingly there

have been calls for the field to attend more explicitly to political dimensions of energy transitions (e.g. Meadowcroft 2011; Geels 2014; Kern 2011; Scrase and Smith 2009).

Specific concerns have been raised about the extent to which 'the state' is properly understood and accounted for within transitions scholarship (Johnstone and Newell 2016). This includes thinking about the state's role in transitions and transformation (Meadowcroft 2011; Kuzemko *et al.* 2016; Lockwood 2014), explored through transition management approaches (Kemp *et al.*, 2007), work on the governance of energy transitions (Verbong and Loorbach 2012) and around specific state functions in relation to transitions such as the entrepreneurial state (Mazzucato 2013; Mazzucato, 2015) or the use of industrial policy (Pegels 2014). But there continues to be a neglect of more systematic and comparative thinking about the relationship between different forms of state and statehood and different approaches to transition and transformation. This constitutes a broad canvas, from an exploration of how types and depth of democracy produce different types of (energy) pathways, for example (Johnstone and Stirling 2015), to the role of electoral and party systems and specific policy processes and styles of decision making, to different political economies constituted by an array of state-society complexes captured in part by the notion of varieties of capitalism (Hall 2001).

2. Aims, Approach and Intended Contributions

Keeping in mind our focus as outlined in the Introduction, this paper conducts a comparative analysis of the politics of transitions around solar PV (including grid-connected, mini-grids, solar home systems and solar lanterns) in two contrasting developing country contexts, Kenya and China. It is based on two empirical studies that sought to reconstruct a historical political economy account of the emergence of solar PV in each of these countries. These are described in more detail below but, in addition, readers are encouraged to read the two Working Papers that describe each country study in depth (see Geall *et al.* forthcoming 2017; Byrne and Mbeva 2017).

In Kenya, our empirical material is based on a re-examination, from a political economy perspective, of the detailed innovation history of the Kenyan solar PV market developed by Ockwell and Byrne (2016). This innovation history is based on over 100 hours of recorded interview testimony and a stakeholder workshop. Our new political analysis of this history makes an important new contribution as, whilst Ockwell and Byrne (2016) argue that their approach offers a more systemic and socio-culturally attuned understanding of the success of the Kenyan solar PV market than previous analyses, they are also careful to acknowledge the weaknesses of their analysis in attending to the politics of sustainable energy transitions. This reanalysis of Ockwell and Byrne's previous empirical material was augmented in the current study by nine new stakeholder interviews which focussed on key moments in the history of solar PV in Kenya where political economy dynamics were likely to be most evident. By using a political economy lens to revisit the empirical material already gathered, combined with the deeper work on key moments, a political economy of Kenyan PV niche-building was then reconstructed (see Byrne and Mbeva 2017).

In China, our empirical material focuses on the announcement in 2014 by Chinese national leaders and state energy regulators of a new Solar Energy for Poverty Alleviation Programme (SEPAP), an ambitious plan to help alleviate rural poverty through deploying distributed solar photovoltaic (PV) systems in poor areas. The initiative, which is positioned as an integral component of China's political campaign to eradicate poverty by 2020, aims to provide energy access to the claimed one per cent of the Chinese population currently lacking such access. This includes an ambition to add over 10 GW capacity and benefit more than two million households from around 35,000 villages across the country by 2020, generating additional annual income of over 3,000 RMB for each household, mainly through rooftop and small-scale solar systems (Geall *et al.* forthcoming, 2017).

In order to examine the political economy dynamics at play here, within the broader context of the historical political economy of solar PV in China, our empirical material focuses at two levels (see Geall *et al.* forthcoming, 2017 for more detail). The first is based on detailed policy analysis of SEPAP within the broader historical context of Chinese energy and poverty alleviation policies, tracing the emergence and implementation of SEPAP in China and assessing its social, political and economic rationales via a discourse analytic approach. This was then contrasted with the findings from new fieldwork in Guinan County, Qinghai Province, on the Tibetan Plateau in north-western China, one of the more isolated and underdeveloped regions of western China. This allowed the research to compare the ambitions and claims of SEPAP with the lived energy practices of poor and marginalised people, including traditionally nomadic people, in rural areas of China, allowing insights into the ways in which the politics of energy and development policy play out between local, regional and national state and non-state actors and the extent to which poor and marginalised people do, or do not, benefit as a result. China has received a degree of scholarly attention with regards to environmental policy, particularly the establishment of new industrial capabilities and installed capacity around low carbon energy technologies (Watson *et al.* 2015; Lewis 2013; Lewis 2007; Dai and Xue 2014; Lema and Lema 2013; Urban and Geall 2014) but very little to date in terms of critical reflections on the dynamics of the state and statehood in this regard. Our analysis, therefore, seeks to contribute towards addressing this gap.

Our core aim in this paper is to learn across these two empirical studies to assess what we can discern about the significance of different types of state and statehood for the *form* (direction, inclusiveness, tools used) and *effectiveness* of energy transitions (in meeting pro-poor energy access and low carbon objectives). It combines elements, therefore, of the *procedural* and *distributional* politics of the state in energy transitions.

Questions of power and political economy run through this enquiry. There are open questions about which political economy dynamics are the most important and how best to examine them, which mean that in practice an eclectic range of approaches are used to make sense of key moments in state decision-making about energy futures. On a spectrum these range from policy process approaches (Keeley and Scoones 2003; Keeley and Scoones 2000), to combinations of ideas, institutions and interests (Kern 2011; Naess *et al.* 2015), to versions of political economy which look more at the structural and material dimensions of power and link states to broader relations of social power in the energy sector (Baker *et al.* 2014; Newell and Phillips 2016). Discourses are examined to see how ideas are promoted, discussed, negotiated and contested. Following Leach *et al.* (2010), we analyse discourse through the notion of narratives (Roe 1991) that offer ways to discipline the complexity of the world by simplifying this complexity into plausible stories. Naess *et al.* (2015: 536) argue that 'narratives and evidence' provide a way to examine 'the histories and practices linked to shifting discourses, and how these shape and guide policy problems and courses of action. Institutions, meanwhile, refer to both formal and informal (sometimes called non-formal) rules that enable or constrain actors' agency (Kern 2011: 1120). Formal rules include policies, laws, regulations and standards, while informal rules refer to social norms, cultural practices, and values. Naess *et al.* (2015: 536) describe interests, along with politics, as the 'core of classic political economy analysis', which emphasise 'the interactions of state and civil society, and different interest groups, social segments or classes'. This helps to understand essential political economy questions of who wins, who loses, how and why (Lasswell 1936). This connects the *procedural* (who participates and is consulted in energy policy decisions) and the *distributional* (who accesses finance, technology, electricity, how and on whose terms) such that achieving more pro-poor outcomes means attending to power and politics in the policy processes which create energy policy.

The comparative analysis across Kenya and China makes for what seems, on the face of it, a surprising comparison. The two countries offer stark contrasts on multiple levels, such as size, population, the nature of the state and its relations to markets and democracy. They also look very different in relation to respective activities in relation to our empirical focus on solar PV. China's engagement with solar PV is often characterised as largely focussed on industrial manufacturing, with a strong export market and, more recently, a focus on domestic, grid-connected solar, with strong, centralised state involvement throughout. Kenya's solar PV market, on the other hand, is very much concentrated at the level of smaller applications, particularly SHSs and solar lanterns, together with an emerging market in solar mini-grids. Kenya has very little in the way of manufacturing capabilities and is almost completely reliant on imports (often from China). The solar PV market and its applications for energy access amongst poor and marginalised households in Kenya also seems to be below the radar of central government led energy policy activities (Ockwell and Byrne 2016), which tend to focus more on large grid-connected energy projects, including recent interest in geothermal energy (Newell *et al.* 2014; Newell and Phillips 2016).

It is, however, these seeming differences characterising the two contexts that make for a useful comparison. As we see below, once we unpack the nature of different types of state and statehood in each context, a number of cross-cutting observations emerge, providing useful insights for broader thinking around the role of the state in energy transitions. The analysis challenges explicit and implicit assumptions of how transitions might be managed or controlled, demonstrating how, even in highly centralised states such as China, assumptions of state control are often illusory. This emphasises the importance of taking '[...] account of the historical dynamics of institutional change and the ongoing

negotiations between different groups [...] to reveal how directions of change are negotiated through complex socio-political relations, involving multiple actors over time' (Scoones 2016: 307). More broadly, this emphasises the importance of more politically sophisticated accounts of how the kinds of transformations envisaged in contemporary international policy discourse have, have not and might in future be achieved in practice, in order that we might learn from these in thinking and acting. As Kuzemko *et al.* emphasise:

By understanding governing for sustainable innovations as part of a more complex political whole this allows us to question which interactions between governance actors and actors in energy systems are delivering sustainable practice change and which constrain such change. Just as this is true for scholarly research so should this also be true for policymaking analysis.... it is also necessary to understand the historical energy landscape: who the important actor groups are, what interests they represent and their relationship to governance.
Kuzemko *et al.* (2016: 101)

In this paper we analyse our two historical political economy accounts of solar PV in Kenya and China from the perspective of three, broad analytic categories: (i) the organisation of the state; (ii) the political nature of the state; and (iii) the state in the global political economy. These are dealt with respectively below.

3. The Organisation of the State

The first way in which we analyse the historical political economy of solar PV in China and Kenya is in relation to the organisation of the state. Different states are characterised by uneven power and resources that they can mobilise behind low carbon transformations, reflected in the ways in which they organise and are able to implement responses to energy policy challenges. It is possible to discern two broad types of organisational integration that characterise governance by different states. The first is the level of *vertical* governance integration. This refers to degrees of centralisation/de-centralisation, which have consequences for the form of energy politics, the types of transition that are possible and whether they can be 'steered' from above. It can, for example, take the form of centre-province relations, such as in China, or result from constitutional changes bringing about the devolution and delegation of authority and access to resources for counties, as has recently happened in Kenya.

The second type of organisational characteristic is the level of *horizontal* governance integration. This refers to the organisation of bureaucracies and imbalances of power across government which has implications for interventions in the energy sector (for example the balance of power, authority and resources between ministries of energy and planning, as opposed to those dealing with environment and rural development) and how trade-offs around energy poverty, security and low carbon imperatives are resolved or not as a result. Because of the centrality of energy to growth (Ockwell 2008) ministries of energy and planning often wield more power and authority than departments and ministries responsible for the environmental, health, labour or other aspects of energy policy decision making. These are often reinforced by close and often revolving door relationships with energy utilities and providers with whom they have to negotiate to secure their buy-in and support for key state strategies. As Newell and Phillips (2016) show in the case of Kenya, for example, failure to ensure the buy-in of the energy ministry in early consultations led to the stalling of attempts to get a national climate action plan adopted for the country. For energy policy to be effectively implemented, there is a need for buy-in across all levels of governance, both horizontally and vertically. Likewise, policy alliances among central regulators without effective participation from key local, financial and market stakeholders will face challenges at the implementation stages of these top-down initiatives, as these non-state actors' financial and technological resources are indispensable at project level.

Whilst China and Kenya look very different in terms of their vertical and horizontal governance characteristics, our empirical data reveal tensions and complexities in both cases, with clear examples of competition over resources, authority, and who captures the benefits from particular policies and interventions. As can be seen in each case below, (mis)alignment of interests across the state, horizontally and vertically, is critical to the procedural and distributional effects of energy interventions.

3.1. Organisation of the State in China

China is assumed to have high levels of central state authority and capacity, implying highly integrated vertical governance characteristics. In some ways this assumption is corroborated by our analysis of the historical political economy of solar PV in China. The most obvious example is the way in which central government identified and supported the development of world leading industrial manufacturing capacities around solar PV, a largely export oriented industry with the dominant share of solar panels produced for overseas markets in Europe, particularly Germany and Spain (Zhang *et al.* 2014). But the central state also intervened when a range of factors later led to significant declines in orders (including the financial crisis, trade disputes in the European Union (EU) and the United States (US) in 2008 over alleged Chinese 'dumping' of cheap PV panels and a fall in the price of polysilicon). This hit companies that had hoarded the material and led some Chinese solar manufacturers to the brink of collapse (Urban *et al.* 2016). China's central government responded with a focus on opening up the domestic solar energy market as a rescue strategy for the manufacturing sector. Strong supportive measures, such as a favourable feed-in-tariff (FIT), government pilots, subsidy programmes and concessional bidding

projects were designed and implemented in a top-down manner to expand solar power generation capacity (Chen and Lees 2016). In addition, the development of solar energy was welcomed by many local governments and large energy utilities and manufacturing corporations as a new site for market opportunities and local economic development (Harrison and Kostka 2013; Shen (2017)).

Multiple interests therefore aligned in promoting this 'strategically important' industry (State Council of the People's Republic of China (PRC) 2008). This level of central backing meant that the rescue plan was fairly successful. By 2013 China had become the world's leading market for solar energy producers; by the end of 2015 it had reached a total installed capacity of more than 43.18 GW (National Energy Administration 2016). Over 15 GW was installed in 2015 alone, or more than a quarter of the total installation of solar capacity around the globe that year (IEA 2016).

Similar examples of central state implementation of solar based energy interventions have been seen in the past in relation to energy access. In 1996, the central government introduced the 'Brightness Programme', which targeted off-grid communities across western China. From 2002 to 2007 the centrally planned Renewable Energy Development Project (REDP) sold more than 400,000 solar home systems benefiting two million individuals in north-western China (Sovacool 2012) including nomads in need of a portable, safe and sustainable energy supply.

When a state as powerful as China intervenes decisively it can undoubtedly have a powerful effect. Nevertheless, a more detailed look at our empirical analysis of SEPAP in China paints a more complex picture, which challenges these assumptions around the extent of central state actors' agency to effectively govern energy policy implementation. After President Xi Jinping's December 2015 vow to eradicate poverty in China by 2020, SEPAP was elevated from pilot programme to national campaign and received the highest level of political endorsement. But a lack of horizontal governance integration led to competing state objectives around industrial strategy and development targets being held in tension, frustrating the ultimate outcomes of SEPAP in relation to the latter.

As Geall *et al.* (forthcoming, 2017) show, recent poverty alleviation programmes in China are typically designed around two major criteria: the so-called 'precision' (精准 *jingzhun*) and 'industrial' (产业 *chanye*) requirements. The former emphasises government subsidies and assistance spent on the basis of precise and comprehensive data, so that specific households or villages can be targeted and helped. The latter, industrial, approach emphasises the improvement of industrial or productive capabilities of underdeveloped localities by developing creative and innovative industrial facilities, so that these households and villages can become self-sustaining in the long run.

What emerged from SEPAP is an example of the important role of different types of state bureaucrats in determining the distributional outcomes of any policy. Its remit bridged energy regulation and development, the domains of two separate administrative departments. The aims of SEPAP initially seemed to align both their interests. Energy regulators were looking for a solution to high levels of curtailment in western provinces (with the highest levels of energy supply infrastructure) that had resulted from the rapid expansion of solar installations outpacing grid connections. Regulators were encouraging small-scale, distributed solar systems, where the energy produced can be consumed locally, but had been unable to meet their targets for distributed solar as investors favoured large-scale solar parks, as such capital-intensive investments provide more stable financial returns in the long run. SEPAP, therefore, received support from both poverty-alleviation and energy-focused officials, who found a compatible strategic vision that could benefit residents while helping to absorb overcapacity and increase distributed solar PV generation.

In practice, however, SEPAP's governance structure meant that energy regulators, rather than development officials, took the lead. Although SEPAP is co-governed by the National Energy Administration (NEA) and the State Council Leading Group Office of Poverty Alleviation and

Development (CPAD), the decision-making power largely resides in the NEA, and in particular its Renewable Energy Department. This is because most of the implementation agencies (grid companies, solar corporations, and policy banks) are either directly or indirectly regulated by this department, while CPAD only play a supporting and monitoring role, with no administrative authority over the these agencies apart from the local poverty alleviation offices.

This made a tangible difference in terms of the approach to the problem. The NEA's priority interests were reallocating industrial capacity. Energy regulators typically have skills in supply-side management and experience in promoting industrial capacity, for solar panels and large solar plants for example, but they possess limited knowledge with regard to local contexts, or poverty and development issues, particularly at the grassroots, village level. As the regulator for industrial policies and industrial sector development that usually focus on supply-side expansion (such as the manufacturing and investment capacities for renewable energy facilities, or upgrading grid services), the Chinese national energy regulator is not experienced or capable of managing demand-side dynamics at the local level (such as the actual needs and difficulties of poor villages and households, local corruption, land disputes, insufficient local data, and transparent reporting systems), which would eventually determine the success of SEPAP as a development rather than industrial project.

This emphasis on industrial development was evidenced in our ground truthing in Qinghai Province, where seasonally nomadic herders relied on off-grid, portable solar PV units, the provenance of which (whether civil-society projects or Chinese Government projects) were often difficult to distinguish from the perspective of the aid recipients. The only observation of a solar PV investment that did seem likely (and was, according to one local interview) to be linked to SEPAP, was a newly built 10 MW solar farm, which was not yet connected to the grid. One labourer at the plant told us it had been built by a Beijing based company and was intended to export electricity to neighbouring regions and provinces via new transmission lines, which could be seen cutting across the pasture (pasture, now enclosed, that was most likely traditional grazing pasture under certain seasonal conditions). Most significantly, she told us that the plant had been built under SEPAP and that it would not have been built otherwise, given the current unlikelihood of obtaining permission for large grid-connected plants due to on-going problems with curtailment. Another Beijing based expert at a Chinese Government think tank said that SEPAP had proven impossible to implement as initially intended, due to the high transaction costs and lack of additional funds. This may account for the type of workaround observed: a workaround driven by local industry looking for a way to clear a project that would otherwise be rejected due to concerns about curtailments; a workaround that clearly aligned with the interests and experiences of the energy regulators tasked with leading implementation of SEPAP and one that does not fit with the original aims of Central Government. When it gets to the level of the local state, the murky reality of village governance in China represents a serious challenge for the implementation and accountability of SEPAP.

Perhaps somewhat surprisingly, therefore, the China case reveals a 'vertically and horizontally fragmented bureaucracy'. Various interests intersect and interact to affect its likely outcomes. SEPAP originated from a leadership-level ambition and an alignment of bureaucratic interests between energy and poverty alleviation regulators. However, in terms of the governance structure of the programme, our policy content analysis and field investigation suggest that it is the energy regulators that have taken the lead in designing and promoting the policy process. It is their priority interests, such as reallocating industrial capacity, that are higher on the agenda. Furthermore, the intersection of these interests with local level power hierarchies have further served to ensure that the intended poverty eradication goals of SEPAP have been subverted to serve myriad local interests that are unlikely to be aligned with the more marginalised needs of, for example, nomadic herders. Hence, even in a centralised and well-resourced state like China Central Government ambitions can be frustrated by, and get caught up in, local politics which seek to re-work interventions to their own advantage.

3.2. Organisation of the State in Kenya

In Kenya we again see examples of how vertical and horizontal governance impacts upon the ways in which different interests vie for power and mediate the impacts of energy policy. On 27 August 2010 President Mwai Kibaki promulgated the new Constitution of Kenya (ROK 2010), devolving a significant amount of power from the National Government to the 47 County Governments and splitting energy policy duties between the National and County Government levels. The National Government formulates energy policy, while energy planning is devolved to County level. Although the most recent draft energy policy provides some detail of the division of labour between National and County Government levels, there is evidence that the structure of energy governance is proving contentious. According to our research, there are some officials at the County level who see the Ministry of Energy and Petroleum (MEP)¹ as not necessarily implementing the spirit of the Constitution. Rather than devolve powers to the counties, the MEP appears to see the Counties' task as implementing national energy policy (Byrne and Mbeva 2017). Of course, it makes sense that some functions of energy policy be coordinated at the national level. But the enactment of the new Constitution appears to have created expectations that there will be more control over policy at the local level, with counties emerging as a major sub-national 'state' actor in Kenya. And, clearly, this has implications for resource flows, as much as it does for autonomy over energy developments.

As well as these emerging national-county tensions, our interviewees also alluded to emerging tensions around governance practices *within* Counties. But, alongside these emerging signs of less integrated vertical governance, our analysis of the political economy of Kenyan solar PV also identified a significant example (the Institutional PV Systems Programme) that suggests that, when it is in its own interests do so, national state actors can bypass counties and other actors and act decisively to deliver energy services via off-grid solar PV applications. This seems to contradict strongly the received wisdom that is perpetuated by donors and many commentators, that the Kenyan PV market owes its success to a perceived absence of state intervention. It is also in stark contrast to the historical ambivalence and outright hostility towards solar PV within national energy policy that has tended to characterise national state actions and attitudes in relation to solar PV in recent decades (Ockwell and Byrne 2016). The Institutional PV Systems Programme was initiated in 2005 with 'huge' resources behind it (Hankins *et al.* 2009: 3). There was no indication of this programme given in the preceding, 2004 national energy policy, but it required a large amount of spending by the Kenyan Government and this has continued up to the present. As described in Ockwell and Byrne (2016), the Programme seems to have emerged as an *ad hoc* response to pressure on the Ministry of Energy (MOE) from the President's Office soon after Mwai Kibaki was elected President in 2002. According to this account, Kibaki had promised the people in the Northeast Region (an area of arid and semi-arid land with little electricity grid infrastructure and sparsely populated, predominantly by pastoralists) that they would get electricity upon his election. When the MOE was told to find a way to fulfil this promise, it is said that the only quick solution would be to use off-grid PV systems. The idea was to electrify schools and then to move onto other community services facilities. Whilst there have been problems with the programme, it has indeed electrified a huge number of remote schools and other facilities. More than 4000 schools have been electrified with PV systems, according to the Ministry, at a cost of billions of Shillings (the precise figure is not known) (National Treasury 2010–2016). This commitment to electrification of rural schools is now continuing as part of new national state commitments to provide laptops to every primary school child (laptops which need electricity to charge the batteries) (Kiberenge 2013; Muindi 2013; Ombogo 2013; Ongiri 2014).

This seems to be an example of national level, central state actors exercising direct influence on the delivery of electrification, in contrast to the 'free market/market enabling' stance adopted in national energy policy and lauded by international donors and independent commentators. In order to follow

¹ Previously Ministry of Energy (MOE).

the President's order and find a way to fulfil his promise, the role of central state actors was seemingly easily reframed, from delivering 'electricity at a national scale, to be developed over long investment timescales' to 'electricity within a very specific context to be delivered quickly'. And the benefits for schools and other public buildings, used by many poor and marginalised people across the Northeast of Kenya, seem significant.²

These illustrations from China and Kenya underscore the need to get inside the state and not view it as a monolithic and unitary actor. They also illustrate how the purpose and nature of interventions can change over time as personnel and their interests and expertise change. Networks, alliances and coalitions are required to carry policies and overcome incumbent resistance and barriers to action. This means adopting framings or developing issue-based coalitions that can carry a policy. The implementation of high level energy policy goals can meet barriers in the form of variegated interests, stratified, often simultaneously, across both vertical and horizontal levels of governance. Although, as we have seen in the case of the Institutional PV Systems Programme in Kenya and early Chinese central state engagement with creating industrial solar capacities, it is possible to identify examples where targeted central state ambitions, with high level support, can sometimes align with local needs in ways that make tangible differences.

² Note: it is difficult to establish whether the Presidential push was the only reason for this programme. No State actor agreed to be interviewed about the Programme and so we only have comment from 'outsiders'.

4. The Political Nature of the State

Beyond questions of the organisation of the state in bureaucratic terms along vertical and horizontal lines and the ways in which this affects energy pathways, the nature of the political system associated with the state is also vitally important in shaping procedural and distributional effects of energy interventions. We refer to different degrees of democracy and the scope for democratisation of decision-making, for example around identification of energy needs and priorities. This might be extended to decision-making about technology choices and R&D priorities and in relation to energy planning, electrification and pricing. Who participates, on whose terms and what difference does it make? Who gets consulted or not and perceptions of energy needs concretely affect energy policy decisions. We saw this above and will see it below in the case of China where there is a mismatch between the need for mobile rather than static technologies to reflect nomadic lifestyles. The seasonal movements mean there is a continued need for off-grid which is overlooked by central planners and local elites. How much scope is there for consultation, participation and contestation around policy and project priorities and in evaluations of their effects? How are contentious energy politics handled? The shift from the previous section is also towards a focus on styles and modes of governing: whether more top-down, negotiated, inclusive or elitist, why this matters, for whom and for what. Different approaches to managing politicisation reflect different 'politics of control'.

Literatures in development studies increasingly emphasise the importance of political settlements (Khan 2010) and political economy approaches to understanding power in particular contexts. Political economy analysis is utilised, for example, by donors seeking to understand the national political context into which development assistance is received (c.f. Routley and Hulme 2013). Political economy in these studies is typically understood as the identification of vested interests and systems of political incentives that frustrate governance reform programmes, limit the performance of public institutions, and disincentivise private investment (Desai 2011). From this perspective, Kenya's failure in recent years to deliver on the promise of economic transformation has been attributed to a set of national political and socio-economic relationships characterised by 'competitive clientalism': fierce electoral competition enmeshed in systems of political patronage with strong ethnic dimensions (Booth and Golooba-Mutebi 2014; Khan 2010) where the political elite have been able to capture public institutions and resources to serve their private interests (Ng'ethe *et al.* 2004).

Similar insights arise from analyses elsewhere in Sub-Saharan Africa. In detailed empirical analysis of the Ghanaian cocoa bean industry, which they contrast with the case of the sugar industry in Mozambique, Whitfield and Buur (2014) propound a 'political survival of ruling elites' approach (Whitfield *et al.* 2015) to understanding the conditions under which industrial policy is successfully implemented or avoided, which we could usefully extend to think about energy policy. This approach:

[...] emphasises that government's policy choices and its ability to implement them, as well as its interactions with businesses, are shaped by incentives arising from the imperatives of ruling elites to remain in power and thus build and maintain political support. It argues that the state is never completely insulated, and no set of ruling elites is completely autonomous. Rather, what matters is how coalitional pressures shape the political costs of certain policies and the ability to implement them, given the resistance or support from factions and individuals within the ruling coalition and those financing it.

Whitfield and Buur 2014: 27

This kind of political economy analysis arguably provides an account that can engage with African politics and aspects of patronage that often cut across the artefacts of colonially imposed constitutional landscapes. Rooted in studies of African political economy, in this way Whitfield and colleagues are able to explain the way in which power is distributed in specific Sub-Saharan African contexts and how they

result in active incentives not to build technological capacities in specific sectors (such as energy). Through this, they are able to explain why reforms which serve collective interests are unlikely to happen pre-election (and in many cases, not at any time). As they go on to say:

Whether (a faction of) ruling elites have mutual interests with a particular group of capitalists depends on whether they need those capitalists for their primary objective of political survival through building and maintaining their ruling coalition in order to remain in power. In democratic political systems that includes winning elections... In short, political survival means accommodating powerful groups, which can include financiers of political parties; firms or families who dominate key sectors in the economy; political elite factions with strength derived from their organisational capabilities; and lower levels whose support is needed to mobilise votes.

Whitfield and Buur 2014: 129

As Barnett (2014: 27) emphasises towards the end of a report that is otherwise fairly upbeat in expounding the value of political economy analysis in assisting practitioners and policy makers in better designing development interventions around energy sectors, [...] it must be accepted that the overarching political environment in Africa may not be conducive to change'.

Politics and power in many Sub-Saharan African countries differ in important ways from many Northern countries, rendering traditional (European/American produced) accounts of state politics redundant. So, for example, Michael Mann's 'infrastructural power' thesis (Mann 1984), where states are able to extend their power by extending infrastructure (such as energy infrastructure), does not play out in the same way in many African contexts where state power is achieved and exercised more through social, cultural and family networks. This resembles a far more distributed and responsive (to local constituents) model of the state (but not in a Weberian sense (Weber 1922)) – whereby states are not accountable, but rather pulled in multiple different directions.³ However, it is important to note that, while this literature has focused attention on the specificities of African polities, it is somewhat constrained by national frames of analysis comprised of ruling political elites, state bureaucrats and domestic firms (Booth and Therkildsen 2012).

Nevertheless, the politics of energy in specific contexts are revealing of which social and economic interests the state seeks to serve. Newell *et al.* (2014) demonstrate how Kenyan central government interest in low carbon energy is strongly focused on large, grid-connected infrastructure (for example, geothermal) and the needs of large, powerful industrial interests (which often, in Kenya and China, directly intersect with the interests of powerful politicians). Despite the success of the off-grid solar PV market in Kenya, and notwithstanding the anomaly of the Institutional PV Systems Programme mentioned above (which, as mentioned, is not covered by any official central state energy policy), comparatively little political attention is afforded to solar by the Kenyan Government, other than nascent, though rapidly increasing, interest in large, grid connected solar. Interest in electricity access is focused purely on ambitious grid expansion plans which rarely serve the needs of the rural or urban poor who often live within the extent of the grid but lack the resources to connect to it (or live in more marginal areas where grid connection is unlikely any time soon). It would seem then, that where state (understood as the Kenyan central government) 'control' (Stirling 2014) is exercised in relation to low carbon energy, the resulting changes have distributional implications that favour powerful industrial and political interests over and above the interests of poor and marginalised people.

Questions have also arisen in Kenya around the extent to which new, county level decision making structures, introduced under the new constitution, will impact on the practice of energy governance,

³ Weber contrasted state bureaucracies that achieve legitimacy through their relation to legislative order with traditional forms of authority arising, for example, from kinship.

especially in regard to how citizens will be included (Johnson *et al.* 2016). Our interviews suggested that county energy plans were unlikely to focus on solar PV for energy access amongst the poorest people, many of them suggesting that the political salience of water would privilege a focus on this over energy access. Several interviewees suggested that bypassing state actors and working with non-state actors was the most effective way to privilege a focus on solar PV for energy access. An example was given of one county (that has already signed memoranda of understanding with several private companies) is designing financing mechanisms for PV, plans to develop its own regulations to foster renewable energy promotion, hopes to provide subsidies for low-income households to get solar, and is in discussions with a private investor to open a solar manufacturing facility. However, one private sector interviewee was cautious about involvement at the county level, citing heavy bureaucracy as an impediment to progress. Civil society actors and donors are also focussing attention on county energy planning. The World Bank, Gesellschaft für Internationale Zusammenarbeit (GIZ) and Netherlands Development Organisation (SNV) were all named in interviews, and one private sector interviewee mentioned that the UK's Department for International Development (DFID) and the Kenya Association of Manufacturers are also active at the county level.

How all this will play out is, of course, open to question and debate. What will be the nature of relations, for example, between powerful donors, NGOs, international investors and capacity-constrained county administrations? Will local people actually get to participate or will county-level administrations replicate the notoriously corrupt practices seen for so long at the national level? To what extent will national energy policy begin to reflect the diversity of interests and needs of the counties rather than treat the nation as relatively homogeneous? If these dynamics play out unfavourably in the eyes of either county or national-level interests, what will be the effect on relations between the counties and the centre? There are many questions that arise around the new political economy of energy in Kenya, all of which underscore how the political nature of the state can have material impacts on who gains, who loses, whose interests are privileged, and when and how, in defining the nature and directions of energy transitions.

We also find evidence in China of greater state support to those low carbon energy transitions that benefit commercial elites. Since the central government in China identified low carbon energy as a strategic sector for economic development, China has developed world leading capabilities in solar PV manufacture (as well as wind (Lewis 2013; Dai and Xue 2014; Lema and Lema 2013)). This astonishing 'transformation' seems, however, on the face of it to be very much a story of export oriented, industrial development (Urban *et al.* 2016; Watson *et al.* 2015; Tyfield *et al.* 2015). There seems to be comparatively little literature about China's development in the solar PV sector (or wind sector) that is directly oriented towards meeting the needs of poor or marginalised people, particularly those without access to the grid. As with Kenya, we observe, on the face of it, political economy dynamics playing out that favour large, industrial interests and the interests of those connected to the grid.

This is not to disregard the recent emergence of SEPAP and related national government policies that seek to provide access to electricity for the claimed one per cent of the Chinese population currently lacking such access where a focus on energy access and poverty includes an explicit role for solar PV. But it is to recognise insights from other work in China (Tyfield *et al.* 2015; Urban *et al.* 2016) which suggest a number of pro-poor innovations (for example widespread uptake of indigenously designed solar water heaters) have emerged as a result of under the radar (non-state led) activities driven by markets, civil society and local government support. This contrasts, once again, something akin to Stirling's (2014) 'control' (Chinese state led industrial development) with 'care'. Indeed, the state's priorities and preferences are revealed by lack of interest in understanding impact. In the case of SEPAP, for example, there was no monitoring of whether benefits are accrued by poor people or village elites. Rather than an active notion of citizenship, people are viewed as passive consumers of state services such that they are not even 'users and choosers' of state services, let alone more active 'makers and shapers' of services and policies (Cornwall and Gaventa 2000). Local households have little information

or knowledge about these initiatives or their benefits. They are intended to be passive beneficiaries, with little negotiation power with project developers, officials, policy banks or grid companies.

This is not to underestimate the fact that monitoring the distribution of the returns from SEPAP activities throughout a project cycle can be a challenging task. But in order to help meet the needs of the poor, it is necessary to understand better the energy needs, practices and experiences of those users – nomadic pastoralists in this particular case – that SEPAP and related policies have targeted. Most important here, perhaps, is understanding the continued seasonal movement of herders in the county, which mean that at least in this region of Qinghai, mobile, off-grid energy sources are as relevant and necessary for many local people as grid-connected electricity. As Geall *et al.* (forthcoming, 2017) show, 'some current approaches seem oriented towards the needs of industry and urban demand centres, rather than pastoral and rural communities'.

5. States in the Global Political Economy

As well as looking at the organisation and political nature of the state and its particular relationship to energy, it is important to locate the role of the state in energy transitions in a global context which takes account of the power that a range of public and private transnational actors bring to bear on seemingly state-based energy pathways. As with the organisation and political nature of the state, such global political economy dynamics are material to shaping the procedural and distributional effects of energy interventions. Issues of policy autonomy and 'developmental space' are important here. The ways in which the scope governments have to independently chart and follow their own energy pathways are affected by levels of aid dependence, trade ties, their status as energy importers/exporters and how much scope they have to impose conditions on investors around employment, local content requirements and so on.

There are different ways of conceptualising this. Newell and Phillips (2016) draw on the notion of 'disciplinary neoliberalism', to understand how key development agencies and multilateral development banks constrain the policy autonomy and 'developmental space' of poorer countries over whom they exercise control through their lending practices (Gill 1995; Gallagher 2005). They suggest that this has occurred through first wave power sector reforms, and then a second wave of interventions aimed at trying to address energy poverty (produced in part by the first wave of reforms) and the challenge of de-carbonisation simultaneously, a dynamic usefully understood through the lens of 'governance states' (Harrison 2004). Harrison uses the term to describe the World Bank's attempts at, 'reconciling a global political economy with its own designs and a specific set of challenges posed by the African region' (Harrison 2004: v). A high level of external influence, whereby the Bank is intimately involved in policy making, means that any clear distinction between the Bank and an autonomous state becomes difficult to discern. Through these negotiations, energy pathways are narrowed or opened up by the presence and interests of global actors and their interactions with state elites. This raises key questions about what instruments states have available to them to address the challenges of de-carbonising their economies in a socially just manner, when many have ceded direct control over the energy sector (Tellam 2000). The disciplinary role of international finance institutions in shaping energy sector liberalisation in Kenya, therefore, requires an account that is transnational, with due attention to how capital and domestic political economies are intertwined (Newell and Phillips 2016).

Interestingly, China's investments in Africa, including Kenya, may increase Kenya's policy autonomy over energy choices, albeit in ways which might undermine support for low-carbon options. Newell and Phillips (2016) show how China has emerged as a potential contender to the power of Western donors. The availability of Chinese financing could provide the basis of a broader shift in the geopolitical 'landscape' that shapes both technology choice and the policy autonomy of the Kenyan state. Particularly in relation to the large hydropower regime that characterises Kenya's energy infrastructure Chinese loans are thought to come with fewer 'strings attached', such as the KSh150 billion (around US\$1.5 billion) High Grand Falls hydro project which was a focus of a trip to Nairobi in 2013 by senior officials from the Chinese Exim bank, so that Kenya can look to China for alternative sources of finance that are perceived to be faster, come with fewer conditions, and are more flexible. Specifically, China might be tempted to benefit from the reluctance of Western development banks to invest in fossil fuels and their insistence on procedural norms of consultation in the development of large hydropower projects, to secure new projects with the Kenyan state including around the discovery of oil in Turkana and coal in Kitui areas.

Nevertheless, Shen and Power (2016) demonstrate how the politics of Chinese companies' commercial interests in Africa are far more complicated than depictions of Chinese neo-colonialism (Economist 2008). Rather, they relate to more complex inter and intra-state domestic political economy dynamics in China which create incentive structures for certain Chinese firms to pursue potential markets in Sub-

Saharan Africa. This emphasises again the need for a more relational understanding of the state and the ways in which interests and outcomes are negotiated through a web of power dynamics that spans both state and non-state actors within broader politic economy contexts (Johnstone and Newell 2016).

The political economies of Kenya and China are clearly organised in distinct ways in terms of the balance between state and market, public and private. This is reflected in different views of the private sector (managed on the state's terms in the case of China) and a preference for market-led approaches in Kenya, pushed by donors and the World Bank. It is also worth looking at the hybrid nature of policy and commercial networks where business groups have uneven access to different parts of the state, and state and commercial interests coalesce around particular energy technologies and pathways, often in competition with one another. The reality of hybrid forms of power and the meshing of public and private actors, networks and finance calls into question the respective discursive constructions of the failures, inefficiencies and comparative advantages of states and markets alike in enabling energy transitions.

Such dynamics are clearly illustrated in our historical political economy of solar home systems in Kenya. As alluded to above, this history is characterised by key early private sector actors, working with clear humanitarian agendas around rural electrification, working hard to construct a 'market failures' narrative around what policy interventions were required to support market development. This narrative was constructed in a way that fitted directly with the neo-liberal stance of donors, enabling solar niche actors to leverage significant donor funding for a range of interventions that more closely resemble traditional, public sector capacity building than any kind of neo-liberal market creation. For example, Byrne shows how this market-failure narrative was built by key early players in the market, such as Mark Hankins who claimed '[t]he phenomenal growth of the Kenyan market has occurred almost entirely on a commercial basis' (Hankins 1990: 2). When the story was subsequently adopted by others, it tended to be simplified, and this simplified version has persisted up to the present where the market is usually described as 'unsubsidised' (Ondraczek 2013; Jacobson 2007).

A more nuanced version of the development of the Kenyan PV market, based on alternative analyses (see Ockwell and Byrne 2016; Ockwell *et al.* 2017), would argue that donors helped the market evolve whilst the private sector later helped it grow. That is, donor-funded interventions enabled experimentation with new ideas and the creation of key capabilities (e.g. development of a PV curriculum for training technicians, early, publically available market research, production of manuals for PV users, vendors, and installers) all of which helped to establish the PV market in Kenya and later to increase sales of PV products. The market failure narrative worked as a political strategy. It persuaded a variety of donors to direct resources into the Kenyan PV market, and to do so over a long period that enabled the building of the Kenyan PV niche along several socio-technical dimensions. In so doing, the narrative and interventions became something of a virtuous circle. In other words, the attempts to fix 'market failures' seemed to be working, making it easier to attract further funding to fix other 'market failures', and all the while providing the convenient fiction that the market was unsubsidised, thereby strengthening the veracity of the market-failure narrative (Byrne and Mbeva 2017).

Whether or not these early PV actors in Kenya believed the narrative is not important. Instead, it married what these actors perceived or diagnosed to be market development needs together with the free-market ideology of actors such as the World Bank and several other major donors (for example United States Agency for International Development (USAID), DFID). In other words, the early PV actors successfully developed an argument that was based around some version of the notion of market failures. First, they would see that there was a need to make an intervention in the Kenyan market. Then, by invoking a market-failure assessment of the problem, they would construct a justification for this intervention and present this in a project proposal to a donor. The justification exhorted the achievements of private sector actors in developing the Kenyan PV market, but then explaining that they were being hampered because of some unknowns, or technical difficulties, or capacity constraints,

etc. What was needed, therefore, was an intervention to help all private sector actors; an intervention to make it easier to conduct their market activities, i.e. to fix a market failure. This justification suited the donors because it appeared to be about supporting the development of free markets, rather than subsidising the purchase of SHSs or giving them for free.

What we see, then, is the development of narratives by investors and donors towards the state which embody claims about what form a desirable 'business climate' would take in terms of security of investments, predictability and certainty around policies and time-frames. Despite critiques of the state, there is also intense competition among business actors to represent themselves as best able to deliver state energy goals, and there are fierce battles over state regulation and support to protect or undermine incumbent actors and nurture or squeeze niche actors. This includes the use of the state by private actors to close down competition from other niches. The Kenyan PV case provides an example of such efforts to close down competition within the emerging new PV niche. In the late 1990s and early 2000s, the Kenyan Bureau of Standards was persuaded by actors in the PV industry that something needed to be done to introduce formal standards around the quality of solar home systems. A committee of existing Kenyan PV actors was convened to advise on this and agreed on the introduction of PV standards. But these standards were not widely adopted by technology suppliers and installers, leading to the eventual introduction of regulations. These introduced strict, legally enforceable rules around PV in Kenya and characterise a period of gradual closing down in the market around accepted norms of what represented good and bad practice. Through the connections developed between the recently-formed Kenya Renewable Energy Association (KEREAA) (an association created and convened by key early actors in the solar PV niche), the Kenyan Bureau of Standards and other national energy policy actors during the standards and regulations setting processes, we can see the beginnings of advocacy efforts by the PV industry to influence energy policy in Kenya. These PV regulations could be seen as an attempt by the established actors to shut out new entrants and consolidate what they have already gained, making it more difficult for technicians, in particular, to gain access to the PV market. It may also have constrained, to some extent, experimentation with new ideas.

It is also important to recognise that these interests are not clearly fixed. In Kenya, for example, we see the development of new coalitions of interests and lobbying on their behalf. The early neglect of PV or, as some would say, hostility toward the technology from national state actors in Kenya began to change in the period just before the development of an updated energy policy, a draft of which was published in 2004 (MOE 2004). It is difficult to know for certain, but it appears that some deeper interactions between PV actors and some state actors may have helped to create a somewhat more favourable and supportive view of PV from national state actors. These deeper interactions began with the above mentioned process of formulating PV standards, which began in April 1999. This process had involved some PV actors forming a committee with actors from the Kenya Bureau of Standards and spending a few years meeting regularly to discuss and deliberate on what PV standards would be appropriate for Kenya. In 2002, various PV actors developed an alternative national energy policy in parallel with the official policy making process led by the Ministry of Energy (Ockwell and Byrne 2016). Although there were occasionally tense interactions between actors involved in the two policy making processes, it would appear that the official policy did adopt some of the views of long-standing PV advocates. This is apparent in some sections of the policy, which refer to the PV market in terms similar to those used in the well-established story of the private-sector-led phenomenon and the market-failure narrative noted above. Other parts of the policy document also suggest a warmer attitude to PV compared with the earlier period, although it does not develop any specific strategies for PV beyond broadly supportive statements. In effect, it takes an 'enabling environment' view of the issue of PV promotion in line with the pervading free-market ideology. This somewhat more favourable view of PV continues into the latest version of the energy policy, one that has been developed to accommodate Kenya's new constitution, and which splits energy policy duties between the national and county government levels (MEP 2015). The only policy introduced between the 2004 and 2015 energy policies that could be seen as active promotion of PV was the FIT (MOE 2012), although the solar FIT has been criticised by local

actors for being unattractive (see Newell *et al.* 2014) who report that the former Permanent Secretary of the Ministry of Energy is alleged to have lobbied to fix the PV FIT deliberately low so as to not attract investors). In general, the other strategies, as with the 2004 policy, are about the enabling environment (standards and regulations, certified training, information for consumers, etc.). This approach may suit the state in that it can claim to positively support PV so as to satisfy local PV actors and donors interested in clean energy development whilst not having to commit resources to active promotion of the technology.

The Kenyan national state narrative around PV has evolved from being non-existent to adopting similar rhetoric to the narrative long-promoted by local PV actors (and, for that matter, many analysts beyond Kenya). This could be seen as a convenient narrative for Kenyan state actors, as correcting market failures (taking the narrative at face value) may not require extensive action or the commitment of significant resources. Instead, policies can be focussed on providing an enabling environment, something that is not well defined but could include standards setting, information sharing, certifying training courses, and other similarly low cost actions rather than testing new ideas – whether technological, financial, managerial, or others – in risky projects with multiple stakeholders. Moreover, these kinds of 'enabling environment' activities fall in line with the market-led ideology of donors who may, as a result, still be willing to provide the funds to put the activities into practice. Instead, the state can continue promoting large-scale low carbon energy projects such as those for geothermal electricity generation, whilst appearing to be supportive of the whole range of low carbon energies. Occasionally, the state has responded to lobbying from PV actors to provide specific supportive measures, such as introducing PV regulations and certifying training courses, but it is able to largely ignore the wishes of the PV sector and concentrate on meeting the needs of large industrial users (Newell *et al.* 2014).

Looking back at the analysis of these two narratives of market failures and creating enabling environments, there is to some degree a symbiotic relationship between them. That is, eventually at least, both the state and PV actors seem to be getting what they want. Both sets of actors seem to be content with seeing the Kenyan PV niche as a private sector phenomenon and that fixing market failures will suffice to see it continue to grow. For PV actors, this means they can continue to seek support from donors to fix market failures while national state actors can continue to ignore PV, responding only occasionally with low-cost actions. This suggests that state actors have co-opted the long established PV narrative to serve its own interests.

As well as lobbying, occupying available institutional spaces and building narratives around the desirability of preferred technologies and regulations, businesses also play a vital role in energy pathways as 'street level bureaucrats' (Lipsky 1980), the implementing agencies of state policy. State departments have to negotiate with businesses that are the subjects of regulations on the ground because their foot-dragging and non-compliance around reporting and enforcement can subvert the intention of government interventions. This is as true of VAT payments on the import of solar equipment that has been a key controversy in Kenya (Newell *et al.* 2014) as it is both for PV standards (as we have seen above given their effects on smaller producers) and attempts to control the quality of products in the market.

States may lead, but they also rely on financial actors, public and private, to mobilise the necessary finance and help deliver goals and have to ensure their buy-in. It is clear, for example, from our political economy analysis of China, that central government endorsement is not enough to implement China's SEPAP without proper financial incentives for solar companies and policy banks (Geall *et al.* forthcoming, 2017). Some poor counties may attract companies to implement SEPAP by offering the opportunity to develop large scale solar parks there. Yet facing severe curtailment, these opportunities may be less tempting, and Chinese policy banks are currently expected to finance the whole 5.16 GW of capacity by themselves, around 120 billion RMB according to current market prices. But these actors are likely to be cautious of providing upfront financing where poor households and villages can provide

little collateral for loans and the prospect of returns are uncertain. Widespread problems in rural areas with poor grid connections and delayed subsidy reimbursements may damage the viability of these projects. No commercial banks would be interested due to the risks associated with SEPAP projects.

6. Conclusions

We can see from the discussion above that the state plays and performs a range of, often simultaneously, supportive and disabling roles with respect to energy transitions and transformations. This reflects differences within and between states across a number of dimensions. We have noted throughout that what we expect of states with regard to energy transitions needs to be cognisant of the variety in state capacity, autonomy, resources and power to deliver on intended outcomes. Each of these are shared and contested by a multitude of public and private actors within and beyond the state. We explored both horizontal governance challenges across the state and between different ministries and bureaucracies competing for authority and resources associated with energy programmes and interventions, as well as vertical governance challenges the state faces shaped in the contexts of Kenya and China by devolution and contests between the central government and provinces respectively. We also saw how the political nature of the state, how much democratic space exists to participate in energy politics, to define policy priorities and contest projects and interventions, strongly affects distributional outcomes and which actors are able to capture the benefits of different energy pathways. Finally, we saw how the degree of autonomy and independence states have from 'landscape' actors such as donors and transnational corporations that play such a key role in financing energy technologies and infrastructures, impacts upon their ability to project and realise their preferred vision of energy transformation.

In this sense we need to place the state in context. A relational focus invites exploration of state-society complexes and the relations of power which underpin them which are not confined within bounded territories and are often transnationally constituted (Johnstone and Newell 2016). It means not treating the state as an independent, atomised rational actor. Rather it requires an appreciation that the state is not neutral with respect to the actors and processes it is charged with regulating (Saurin 2001). This is perhaps especially true with regard to energy because of the nature of its relationship to growth, development ambitions and militarism and the potential for state elites to secure rents from energy resources in the ways described by work on resource curses (Ross 2012). Moreover, lack of access to energy and revenues from energy has the potential to generate popular social unrest. Popular resistance to changes to fossil fuel subsidy regimes in many parts of the world (Ockwell *et al.* 2009; Lockwood 2015) illustrates clearly why state elites tread carefully when considering changes to the energy regime.

We have seen how hybrid networks bring businesses and state actors together around particular visions of how the energy system should be organised, inviting a more nuanced understanding of where agency lies and how far it can be attributed without problems to a sprawling entity such as 'the state'. This raises challenges and critiques of the illusions of control regarding state-led transitions that permeate a lot of academic writing and policy work on energy transitions. It points to the difference in Stirling's terms between attempting to manage 'the Transition' and cultivating 'plural radical progress' (Stirling 2014). It invites further reflection on how different ways of organising states, their different political complexions and levels of democracy, types of political economy and relationship to the energy base produce, facilitate and frustrate different types of energy pathway and, more challenging still, to establish which ones are most likely to simultaneously achieve the goals of tackling poverty and decarbonisation of the energy system.

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