

Addressing the Challenges of Low Carbon Energy and Development in Africa

In recent years the growing importance of 'rising powers' like China, India and Brazil in Africa has attracted considerable attention and controversy. Their (re)emergence as international development actors has been discussed principally in terms of their role in the exploitative acquisition of natural resources such as coal, oil and gas. The western media in particular have regularly represented their growing presence in Africa as a kind of neo-colonial resource 'grab' characterised by a plundering of Africa reminiscent of the darkest days of empire.

What such representations preclude, however, is recognition of the simultaneous and growing involvement of the 'rising powers' in the provision of renewable energy technologies in Africa and their potential significance in reconfiguring a range of energy systems within the continent. Seeking to engage more closely with a number of African countries in pursuit of diverse economic and political goals, the 'Rising Powers' have increasingly been incorporating renewable energy projects into their aid and loan portfolios in Africa. The depth, drivers, and outcomes of this activity are complex and contested in terms of both development and the implications for international energy and climate governance.

Our research sought to address these issues by asking the following questions:

- *How, why and to what extent China and Brazil are enabling the transition to low carbon energy systems in Southern Africa?*
- *Who governs energy transitions in these contexts, how and to what purpose? Who sets the terms of transition? Who participates in decision-making on energy policy? Whose interests are served by different models of low carbon transition?*
- *What are the implications for the affordability, accessibility and sustainability of energy services in the region?*

The research explored the dynamics of the energy transitions being created and enabled by China, India and Brazil in Southern Africa. It sought to develop new frameworks for analysis to systematically compare the roles that China, India and Brazil are playing in facilitating the transition to low carbon energy systems in Southern Africa. In particular how they are shaping the provision of energy services for productive uses (e.g. for cooking, lighting and mobility). It also sought to assess the implications for the wider governance of energy and climate change at the local, national, regional and global scales.

Our Research: The Rising Powers, Clean Development & the Low Carbon Transition in Sub-Saharan Africa funded by the Economic and Social Research Council (ESRC): ES/J01270X/1. Fieldwork for the project was undertaken in Mozambique, South Africa, China, India and Brazil between 2012 and 2014 and involved a combination of semi-structured interviews and community-based research methods. Our research also involved the creation of a database of clean energy projects and investments in South Africa and Mozambique.

The 'Rising Powers' and 'South-South Co-operation'

There is a growing interest in the 'rising powers' as donors and global actors in the new 'scramble for Africa' and the implications of their rise for contemporary configuration of international development co-operation. Yet there has often been a failure to adequately disaggregate and historicise the range of different actors involved *within* each of these (re)emerging powers and a tendency to ignore wider structural forces, whilst the importance of African agency has not always been sufficiently acknowledged.

Since a range of different firms and parts of the state engage with different actors in both Mozambique and South Africa and are pursuing a myriad of different energy developments, our research has questioned the utility of the 'rising powers' as an analytical category. There are also a range of other emerging economies (e.g. South Korea, Malaysia, Thailand) that are becoming increasingly significant alongside the continuing importance of established actors such as European bilateral donors.

Multiple and overlapping energy pathways in South Africa and Mozambique

Recent discoveries of mineral and energy resources, particularly coal and gas, have significantly raised Mozambique's profile in international energy markets where the country has been described as the 'world's hottest new hydrocarbon frontier'. Indeed 'rising powers' are increasingly seeking access to Mozambique's fossil fuel resources through resource diplomacy. Yet there are concerns about who will benefit from Mozambique's hydrocarbon wealth and whether it will be used to enhance energy access. The national grid reached just 21% of the population in 2011 and roughly 80% of the country's energy consumption is met by biomass, particularly in rural areas, with the grid infrastructure focused on urban spaces or oriented towards electricity exports to regional markets. Alongside this investment in Mozambique's fossil fuel resources, 'rising powers' have also been investing heavily in renewables.

In South Africa's Integrated Resource Plan for electricity, approved in May 2011, new renewable energy will account for approximately 9% of electricity supply (17.8 GW). Yet 16,383 MW of new coal will also be constructed, suggesting significant commitments to fossil-fuels even as attempts at alternative energy pathways are made. There is also an on-going sensitivity in South Africa about who benefits from the procurement process for renewable energy which is partly shaped by wider concerns around labour and Black Economic Empowerment (BEE).

Theorising socio-technical systems in transition

Transitions are major technological transformations in the way societal functions such as transportation, communication or housing are fulfilled. Successful systems are regarded as tending towards stability, held in place through regimes made up of stable configurations of institutions, rules and networks that determine the 'normal' development and use of technologies. These regimes in turn create both 'path dependency' and 'lock-in' to certain ways of organising energy systems while others remain 'locked-out' and marginal.

However, conventional thinking about transitions has been characterised by a narrow focus on policy management and has neglected the political economies of transition processes. This project has attempted to bring together insights from two broad sets of literature on socio-technical transitions and the political economy of development in order to nuance the Euro-centric orientation of approaches to thinking about transitions to date and to provide a more adequate account of the (global) politics of low carbon energy transition in the region.

Towards a political economy of transitions

Politics and relations of power shape how people and places unevenly experience the costs and benefits of energy extraction, generation, financing and distribution. Consequently we sought to examine how relations of power within and beyond the state shape the adoption of one pathway over another, looking at how much policy autonomy Southern African countries have from business, and from regional and international organisations, to chart their own energy pathways. The ability of Southern African states to steer engagements with foreign actors and markets in ways that align with domestic development priorities is highly uneven.

There are significant differences between Mozambique and South Africa in this regard in terms of their relative power in the global economy (and their attractiveness as investment locations), the degree of influence wielded by international business, the type and depth of power sector liberalisation, the level of aid dependence and the capacity to negotiate with global institutions. The different ways in which the economies are organised in both countries are also critical to understanding the nature of their energy transitions. We examined the extent to which and the ways in which freedom of manoeuvre to select energy pathways has been restricted by external actors and their place within the global political economy: how the terms of 'transition' are set and by whom. Our research thus sought to understand the power of China, India and Brazil as well as other 'external' international actors to re-shape and navigate the domestic political economies of South Africa and Mozambique through energy statecraft, 'resource diplomacy', donor power and the 'diplomacy of development'.

In so doing we have sought to challenge understandings of the state as a benign and coherent actor with the capacity to enforce decisions or the power to provide 'protection' to specific forms of innovation in the face of powerful interest group by focussing on the emergent cleavages within states and among business actors seeking to either protect conventional growth strategies or experiment with new forms of lower carbon development.

Our research showed how energy transitions are shaped by historically produced path dependencies (e.g. the so-called Minerals Energy Complex in South Africa or the colonial export economies of Mozambique) and how they intersect with other kinds of 'transition' (post-apartheid in South Africa and post-war and post-socialist in Mozambique). Bringing political economy analysis to bear upon our understanding of the theory and practice of transitions helps to correct the a-political and a-material basis of existing approaches to transitions. This is helpful for identifying some of the broader 'push' and 'pull' factors that shape investment in energy systems as well as the (in)capacities of different 'development states' to steer that process. Similarly the transitions literature enables us to look inside energy systems and to gain a more nuanced understanding of practices, technologies and actors.

Key Findings

1. 'Rising Powers' are not the determining or dominant actors in any low carbon development sector in either country. Attributing involvement or project ownership in renewable energy to any one 'rising power' can be problematic given the complex, transient and opaque nature of global trade and production networks and transnational and multi-national flows of investment and finance. Brazil is not currently playing a meaningful role in South Africa's low carbon energy sector and similarly China has a limited presence in Mozambique's energy sector. Chinese and Indian companies are, however, currently involved in some of South Africa's largest wind farms whilst India is increasingly playing a key role in renewables in Mozambique, centred on the solar PV module manufacturing plant at Beluluane, funded with a concessional loan from India's Export-Import Bank.

2. Renewable energy investments from 'rising power' economies are not predominantly driven by state-led 'South-South' co-operation objectives. Often renewable energy does not form a major part of bilateral co-operation agendas between the 'rising powers' and Mozambique and South Africa. Rather there is also a very wide range of state, non-state and private actors involved within each 'rising power' (particularly China) such that it is impossible to represent overseas investment in renewable energy as the result of a singular, coherent national strategy.

3. Low carbon development in both countries encompasses a mix of stakeholders from the public and private sector, international and national levels, and political and economic spheres. Likewise companies from 'rising power' economies are bound up in wider networks of construction companies, renewable energy development companies, technology providers and national and international investment coalitions. Thus renewable energy actors and stakeholders are woven into a complex political economy specific to the very unique political, economic and technological context of each country.

4. The importance of global supply chains in renewable energy technologies underlines the complex nature of renewable energy project finance and development. In South Africa, Chinese firms are involved as suppliers of various technological components for solar PV (e.g. Suntech, Jinko Solar, Yingli Green Energy). Chinese firms are also involved in joint ventures with South African companies (e.g. Longyuan Power working with South Africa's Mulilo energy); as the Engineering Procurement & Construction (EPC) company, or as one of the subcontractors (e.g. Powerway). There are also joint ventures involving Indian and South African firms as in the case of wind farm projects operated by Cennergi (involving India's Tata Power and South Africa's Exxaro resources).

5. There are multiple drivers of renewable energy investments from the 'rising powers'. In the case of China these include excess domestic capacity (e.g. around solar), the domination of domestic markets by state-owned enterprises (SOEs), the 'pull' of a favourable policy environment (e.g. RE-IPPPP in South Africa), the opportunity to transform from equipment suppliers and producers to project owners and operators and the finance, support and market/political analysis available from quasi-state agencies like Sinosure, Exim and the China Development Bank.

6. There are strongly divergent views across Southern Africa about the developmental benefits of 'rising power' energy technologies and practices. In South Africa national priorities of localisation and strong trade unions are highly influential over infrastructural and industrial processes and there is mistrust of cheap Chinese imports in all sectors. The renewable energy policy

environment in South Africa is also more heavily regulated even though ownership by international companies (including those from the 'rising powers') is increasing. By contrast Mozambique currently has no renewable energy feed-in tariff or standard agreement for grid-connected mini-hydro, solar PV, wind, or biomass cogeneration. Mozambique has mostly followed a centralised approach to electricity supply through the public utility *Electricidade de Moçambique* (EDM), focusing on large-scale energy projects that prioritise electricity for industry and electricity for export to the Southern African Power Pool (SAPP).

In Mozambique most existing renewable energy projects are funded by donors, mainly by European governments, the EU and the World Bank, but this is starting to change with increased roles for South Korea and India in particular. The process of promoting and extending energy access in off-grid rural areas is led by Mozambique's National Energy Fund (*Fundo de Energia* - FUNAE). Relative to other state agencies involved in the energy sector, especially those with responsibility for hydrocarbons, FUNAE is, however, highly reliant on foreign donors, and has limited resources and capacity with which to manage the installation of renewable technologies, such as solar PV units.

Questions also remain about how much FUNAE's energy projects have increased the percentage of population with electricity access, as the focus of their efforts has often been on schools, health clinics and government offices. Roughly three quarters of Mozambique's population is off-grid and there are doubts over whether Mozambique's national grid could ever feasibly reach the entire population given the high cost of transmission and distribution infrastructure in far-flung regions. Small-scale, democratic and community-managed renewable energy systems are thus a much better fit in this context.

7. There are embryonic attempts in both countries to diversify the energy mix as well as increased interest on the part of 'rising powers' in investing in renewable technologies and infrastructures. There is clear evidence of the increased use of solar PV and hydro-power in Mozambique and of solar and wind energy in South Africa. Yet progress with renewable energies has been inconsistent and often socially and spatially variable whilst remaining somewhat marginal to a fossil fuel based 'business as usual' trajectory that may have 'stalled' the process of low carbon transition. Despite an initially enthusiastic embrace of biofuels in Mozambique, for example, most biofuels projects have since either closed or stalled due to the global financial crisis (affecting commercial lending for biofuels projects), low ethanol prices and technical problems surrounding jatropha for biodiesel.

8. In many ways low carbon transition remains low on the agendas of most actors in both countries and instead it is concerns about the need for cheap and secure energy (for export or domestic consumption), energy access, new technology markets and the need to satisfy local political priorities (such as BEE in South Africa) that are most prominent here.

9. There are multiple energy 'regimes' in Southern Africa and low carbon transitions are being pursued and enacted in different ways across these regimes with multiple state agencies and types of business invested in different energy pathways. Fossil fuels continue to play a central role in the strategies of state and commercial elites in both countries and as a result there is an incoherence to the energy transitions underway driven by contradictions resulting from the exploitation of coal and gas at the same time as investing in solar PV, biofuels and other renewable energy technologies.

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Please visit our project website: <http://www.dogweb.dur.ac.uk/the-rising-powers/>

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