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Citation for published version:

Osunmuyiwa, O, Biermann, F & Kalfagianni, A 2018, 'Applying the multi-level perspective on socio-technical transitions to rentier states: the case of renewable energy transitions in Nigeria', *Journal of Environmental Policy and Planning*, vol. 20, no. 2, pp. 143-156. <https://doi.org/10.1080/1523908X.2017.1343134>

Digital Object Identifier (DOI):

[10.1080/1523908X.2017.1343134](https://doi.org/10.1080/1523908X.2017.1343134)

Link:

[Link to publication record in Heriot-Watt Research Portal](#)

Document Version:

Publisher's PDF, also known as Version of record

Published In:

Journal of Environmental Policy and Planning

Publisher Rights Statement:

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To cite this article: Olufolahan Osunmuyiwa, Frank Biermann & Agni Kalfagianni (2018) Applying the multi-level perspective on socio-technical transitions to rentier states: the case of renewable energy transitions in Nigeria, Journal of Environmental Policy & Planning, 20:2, 143-156, DOI: [10.1080/1523908X.2017.1343134](https://doi.org/10.1080/1523908X.2017.1343134)

To link to this article: <https://doi.org/10.1080/1523908X.2017.1343134>



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Applying the multi-level perspective on socio-technical transitions to rentier states: the case of renewable energy transitions in Nigeria

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ABSTRACT

Although numerous studies have been conducted in recent years on energy transitions, they have been predominately developed and applied in industrialized countries. It is however important to examine the applicability of transition theories, as they are currently formulated, beyond OECD countries. This paper analyses renewable energy transitions in Africa, using Nigeria as a case study, to elucidate the analytical and methodological challenges that sustainability transition studies are facing in developing countries, particularly rentier states. In doing so, the paper employs the lens of the multi-level perspective (MLP) on socio-technical transitions - a well-established theory that emphasizes the role of 'niches', 'regimes' and 'landscapes' in instituting transitions. Based on a detailed analysis of Nigeria, we argue for a more nuanced enquiry of the construct 'regime' that better accounts for the rentier character of the state including the role of political elites and prevalent client-patron relationships. As such, our paper makes an important contribution to the further refinement and enrichment of the MLP by focusing on the political dimensions of energy transitions.

ARTICLE HISTORY

Received 8 January 2016
Accepted 9 June 2017

KEYWORDS

Politics of transitions;
Rentierism; Multi-level socio-technical transitions theory;
Nigeria

1. Introduction

Numerous studies have analysed energy transitions in industrialized countries and in the fast-growing economies of East and South-East Asia (Fouquet & Pearson, 2012; Grubler, 2012). These studies underline the long-term nature of energy transitions, often lasting several decades. Studies on energy transitions have focused on processes and pathways that may explain changes in energy technologies, user relations and the societal impact of innovation. Generally, such studies have linked transitions to societal transformations.

In the study of energy transitions, the multi-level socio-technical transitions theory also known as the multi-level perspective (MLP) (Geels, 2011; Schot & Geels, 2008) has gained prominence in recent years. This theory not only explains transitions in terms of technological innovation and user practices, but also examines the societal factors in transition pathways. The MLP theory differentiates three levels in transition processes: (a) the *niche level*, which involves a network of new technologies in the incubation or nurturing stage; (b) the *regime level*, that represents the engine of existing energy systems as it includes the institutions, associations and governance structures that exist within the dominant energy system and (c) the *landscape level*, including various external pressures that affect transition processes, such as oil price shocks. Accordingly, the MLP argues that transitions are long-term transformations that occur at these three levels.

Despite its strengths, the MLP has faced numerous criticisms. One prominent critique targets the conceptualization of the construct 'regime', especially for its failure to account for problems of agency and the politics

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of transitions (Grin, Rotmans, & Schot, 2011; Meadowcroft, 2011). Implicitly, the MLP acknowledges the role of power and interests in its analysis of the regime (e.g. by examining contestation between vested interests). Yet, due to its theoretical origins in the theory of structuration, the MLP has so far paid less attention to the role and scale of collective actors (Geels, 2011, 2014).

In response to these criticisms, a number of theoretical and empirical studies have been conducted, leading to the development of a variety of conceptual frameworks, typologies and heuristics in understanding the role of actors, agency, power and politics within the regime, and the latter's influence on transitions (Avelino & Wittmayer, 2016; Geels, 2011). These perspectives, however, are still limited in at least two ways. First, they have been applied largely in developed countries (Geels, 2014; Hess, 2014), with only a few examples from developing countries (Baker, Newell, & Phillips, 2014; Rolffs, Ockwell, & Byrne, 2015; Ulsrud, Winther, Palit, Rohra-cher, & Sandgren, 2011). Second, the literature has been very limited with regard to oil-exporting rentier economies (Normann, 2015; Rosenbloom & Meadowcroft, 2014; Torvanger & Meadowcroft, 2011), whose state structures rely on the distribution of rent and is even more scarce regarding countries whose citizens depend on oil for privately generated off-grid electricity.

Accordingly, the main motivation of this paper is to address these two limitations in the MLP literature by presenting an in-depth case study of Nigeria- an oil-exporting rentier country, with significant natural resources (crude oil), and the extraction of such resources serving as the major source of revenue for the state. The focus on Nigeria is motivated by three main reasons. First, it is an African developing country that is broadly similar to other African developing countries in terms of technological and economic develop-ment, allowing us the possibility to extend the generalizability of our observations, to some extent. Second, how-ever, Nigeria is also highly dependent on oil export, making it comparable with a number of other oil-exporting countries. Although almost every country is oil-dependent, in the case of Nigeria this is largely systemic. Specifi-cally, while oil exports only account for 13% of the GDP, 95% of all foreign exchange earnings in Nigeria come from this sector, generating more than 80% of the national income. Due to this dependence on oil, activities in other viable sectors such as manufacturing and agriculture have significantly dwindled (Musawa, 2016). Fur-thermore, Nigeria's recent economic recession and a decline in GDP by a margin of -2.2% due to low oil exports and crash of international oil prices underlines its systemic dependence on oil (Financial Nigeria, 2016). Third, Nigeria is situated in the sub-Saharan African (SSA) region, wherein over 630 million people lack access to energy and more than 750 million people rely on traditional biomass (IEA, 2014). In this context, the provision of additional energy and of renewable energy, becomes ever more important, especially given the exigencies of climate change and the new Paris Agreement that is widely supported by African governments.

Our paper thus examines how the politics of transitions play out in rentier developing countries, especially Nigeria. We identify the key regime actors in energy governance in Nigeria, the strategies and resources that incumbent actors employ to block energy transitions attempts, and submit recommendations for improvement. We build on previous work from Hess (2014), Avelino and Wittmayer (2016) and Geels (2014) on actors, and draw on political economy studies (Geels, 2014; Kern, Gaede, Meadowcroft, & Watson, 2016) as well as rentier theory to critically explore how rentier strategies are employed in resisting transitions. Our study aims to offer a politically nuanced analysis on energy transitions in developing countries in general and in rentier states, such as Nigeria, in particular.

The paper is organized as follows: the following section elaborates on the theoretical and analytical frame-work for the study. In section three, we present the methodology and selected case, then proceed to offer a detailed analysis of strategies and policies employed within Nigeria's fossil fuel regime in section four. Finally, we draw our conclusions and offer recommendations.

2. Analytical framework

2.1. MLP on socio-technical transitions

Transitions are long-term structural changes involving visioning by technology developers, knowledge gener-ation on the form and function of artefacts, and the interaction of such technologies with socio-institutional

regime structures. These are further influenced by landscape factors that create a form of ‘earthquake’ (i.e. pressure) around the existing energy regime (Geels, 2011). It is acknowledged that socio-technical regimes are salient in this interaction, as regimes are established institutional structures that create stability through rule formation that cuts across different issue areas, scales and spaces (Geels, 2011; Smith & Stirling, 2010).

However, gaining in-depth insights into the role of the regime requires a concrete aggregation of the actors, the power(s) they wield, and the politics that foster or deter transitions (Geels, 2011). In fact it has been argued that while certain actors (e.g. civil societies and market initiatives) are pertinent drivers of transitions, they are limited when faced with vested political interests within the regime that represent alternative ideas (Stenzel & Frenzel, 2008).

Yet, we cannot conceptualize the politics of transitions without contextualizing which actors exercise power in transitions and what type of power is being exercised. Avelino and Wittmayer (2016), for instance, highlight power struggles between industry and policy-makers at the cost of others, particularly energy communities and civil society. For example, firms and industry actors use corporate political power such as lobbying, agenda-setting or even institutional strategies in influencing the government in order to resist transitions. As Smink, Hekkert, and Negro (2015) and Stenzel and Frenzel (2008) suggest, these strategies could be ‘defensive’, ‘reactive’, ‘anticipatory’ or even ‘proactive’, when employed in influencing public debates and opinion on technology co-option.

As a consequence, a number of sustainability transitions scholars agree that at the heart of the transitions debate are governmental relations with other actors. In fact, there is increasing knowledge that governmental policies are needed to provide ‘shielding’ or ‘nurturing’ spaces for niche technologies (Raven, Kern, Verhees, & Smith, 2015). Grin et al. (2011, p. 2) affirm this in their analysis of agency in Dutch transitions. Specifically, they argue that to overcome transitions inertia created by incumbent actors, the Dutch Knowledge Network on System Innovations and Transitions approach accepts that ‘the state is central in the collective decision making process of actors within the transition process, because of its focal role and relationship with actors whose activities places pressures on the ecosystem’. This begs the question, what kind of state? A central question in the MLP literature that leads to a renewed focus on a comparative analysis of state functions.

Here, it is important to note that so far, studies on transitions in general and the politics of low carbon transitions more specifically, have been mostly carried out in industrialized countries, with a focus on highly developed state apparatuses (Avelino & Wittmayer, 2016; Geels, 2014). Therefore, findings and assumptions of such studies might not easily translate to developing countries that are often marked by rentier-state characteristics, including weak institutional structures, low tax compliance rates, along with a large deficit in electricity access. As Hess (2014) suggests, one can hypothesize that in a weak political system, fragile institutional and regulatory structures often become threatened especially during elections. Also, oil industries may have a larger influence on the political cadre through corruption, combined with a well-established coalition of industry actors that may perceive low carbon transitions as harmful to their interests. In such national situations, it might be more probable that powerful industrial actors at the regime level will mobilize their vast resources to crush any proposed transition effort.

2.2. Introducing the politico-economic complex of rentier states

To better understand the special context of rent-dependent states, such as Nigeria, it is important to combine the MLP literature with more specific analyses of rentier states. Rentier states are distributive states mainly run with income generated from the export of the dominant natural resource within the country, which is often oil (Reiche, 2010). Empirical evidence suggests that rent in these states can take three forms: natural-resource rents, entrepreneurial rents and policy rents. In addition, an important part of such systems is that the abundance of natural resources not only shapes the political economy, but also obstructs economic diversification and defines the states’ political, social, technological and even demographic structures. Typical examples are members of the Gulf Cooperation Council (‘gulf monarchies’) and other economically underperforming oil-exporting states that have little democratic participation and are often held together by a regime with a politically active military, whose major source of income is the exploitation of low-cost fossil fuel energy.

For this study, we focus on the latter type of states. These are rentier states known to be built on what Salame (1994) describes as ‘authoritarian liberalism’, that is, a government structure that combines powerful political-military elites with a strong role for the corporate sector. Examples of such states are – notwithstanding some differences are Nigeria, Algeria, Russia, Indonesia and Venezuela. The political interaction in such countries is what Geels (2014) describes as relational in nature, or what Beblawi (1987) describes as the patronage network, that is, an internalisation of the private sector, dominant elitist approaches within the government, and the prioritisation of the interests of natural-resource producing sectors in policy-making. Often, then, these types of states have a centralised low-cost energy system that is structured to resist attempts by new technologies to transform the existing regime. Particularly, these energy systems are built to survive on consensual legitimacy (low taxation and energy subsidies as part of a political compromise for regime survival) gained from the civil society (Geels, 2014) (trade unions and citizens) and largely hinged on historically constructed political discourses (Torvanger & Meadowcroft, 2011). As such, the energy systems in such countries are fragile, as any change or pressure within the energy system can create political instability. This is critical in that renewable energy transitions are more decentralised in nature, hence changing the accumulation of power and resources built around existing infrastructure while producing new actors.

2.3. Towards an integrated framework of analysis

The MLP and the rentier theory have some similarities especially at the regime level but differ in certain key areas. Both theories adopt a systemic perspective in explaining key changes in structures, functions and configurations at the regime level. Both assume that in rigid systems, changes can be incremental, in that they occur over a long period of time and are mostly possible through a threat to stability. However, while the MLP analyses a broader phenomenon of socio-technical constellations such as technology actors, institutional gatekeepers, societal norms, markets and user practices limited to a sector or sub-sectors (Geels, 2011), the rentier theory overarchingly describes a political phenomenon or hydra that transcends numerous sectors and shapes the political behaviour of the state including its interactions with the socio-technical system. More importantly, the MLP argues that actors block transitions by being ‘reactive’ to new technology entrants through the creation of tough market entry rules, or by being ‘proactive’ through the enactment of standards that are highly stringent on niches, or by being defensive by limiting access to financing options (Smink et al., 2015; Stenzel & Frenzel, 2008). In this regard, the MLP highlights technology adoption and emphasises institutional structure emphasises places of contestation in transitions (Geels, 2014). On the other hand, the rentier theory shows that the real area of transitions contestation is the political arena, which shapes societal responses to transitions. As such, the rentier theory is useful for sustainability transition studies, as it explores the under-theorized understanding of the influence of political systems, the role of actors and the strategies employed in promoting or blocking transitions.

Accordingly, we develop a regime matrix that combines potential actors in a socio-technical regime and those delineated in a politico-economic (rentier) regime (See Figure 1). This matrix illustrates how both socio-technical and politico-economic actors interact and share ‘spaces’ through resource appropriation, patronage and the alignment of political interests. These interactions on the other hand create a recursive path that allows politico-economic actors to divert material and financial resources of the state using socio-technical actors, as well as their rules and organisational structure in exchange for the maintenance of status quo.

In order to paint a clearer picture of this process, it is important, to pay attention to strategies employed by rentier actors (a combination of political-military-corporate elites) in fostering this recursive relationship inherent in blocking transitions. For this paper, we focus on three main strategies identified in the literature on political economy and rent. First, rentier actors such as government representatives and related elites engage in defensive strategies by ‘capturing the government’ in ensuring that attempts at transitions are blocked (Schmitz, Johnson, & Altenburg, 2013). Rather than focusing on reformulating regime rules and norms to block transitions, this strategy relies on the patronage network between business corporations, governments, the military, political parties and shadow economies. This network, which consists of informal power structures, then systematically weakens attempts at transitions by rendering formal decisions subordinate to regime

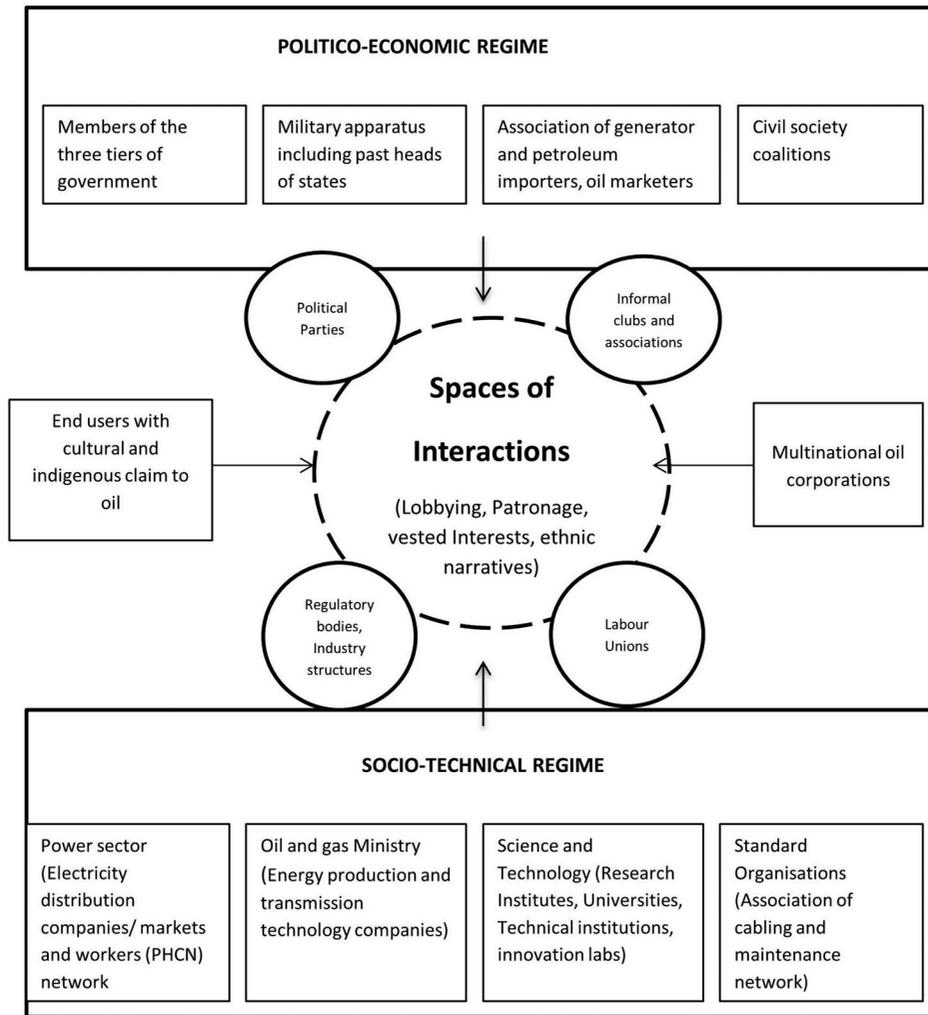


Figure 1. Integrated framework. Source: Author’s compilation.

interests. This may involve financial contributions to political parties, which in turn influences the emergence of political office holders who are willing to retain the status quo (Commander, 2012)

Second, rentier actors engage in the use of discursive capabilities (socio-cultural discourses, ‘scientific findings’, media framings). These activities are aimed at ‘reinforcing and steering public sentiments of indigenous claim to fossil forms of energy’. In this case, actors facilitate research and technical support, expert witness hearings, position papers and sometimes advertisements suggesting the viability of existing energy systems (Murphy, Shleifer, & Vishny, 1993). For example, most oil corporations release energy outlooks aimed at disuading public fears of depletion of fossil resources while also creating artificial debates around the financial costs of renewables.¹

Third, rentier actors engage in the use of structural or institutional resources. The creation of structural and institutional barriers often involves the use of policy and institutional processes that make existing technologies appear superior to proposed transition alternatives. This is achieved through the prioritisation of certain technologies over others by creating ‘sound’ policy arguments on the basis of comparative costs, energy security and technicalities (Kern et al., 2016). Other examples include regime reliance on the institutionalisation and

provision of subsidies as part of a ‘cradle-to-grave’ service, which may be adopted to create a civil society bond towards fossil fuels.

In sum, having theoretically explored how politico-economic actors through recursive interactions with socio-technical actors reinforce and promote path dependence in rentier states, the presented integrated framework will be tested in the empirical section (Table 1).

3. Methodology

In the empirical section, we focus on Nigerias’ electricity, oil and gas and renewable energy sectors. Oil and gas have been consistently used as a form of energy generation at grid and off-grid levels in Nigeria (IISD, 2012); therefore we explored here both the demand (electricity) and supply side (oil and gas). For a rentier state with a less functional electricity system like Nigeria, as the demand for grid-connected electricity increases, there is a commensurate increase in the supply of oil and gas as an alternative off-grid measure (Power Sector, 2012). However, with the emergence of renewable energy as alternative, incumbent political and technological structures become threatened, resulting in the use of political resources (e.g. resource appropriation and patronage) among other things, as strategies to align the socio-technical system (e.g. a specific support programme or bill in favour of petroleum resources) with incumbent interests.

To apply the analytical framework (Figure 1) and understand how various actor interactions shape the transition process, we adopt a process tracing method. This method is supported by qualitative data obtained through document analysis (extensive energy statistics and policy papers from the Nigerian Ministry of Power, both at nation-level and state-level, review of the available scholarly literature, Nigerian Internet sources as well as print media) and interviews. Specifically, the lead author conducted 12 semi-structured interviews in the first quarter of 2014 with a wide range of experts from various backgrounds – directors of academic institutes, senior policy-makers, senior government officials in the oil and gas sector, and representatives of financial institutions. Interviewees were asked about the role politico-economic actors, with a particular focus on how the dominant rentier culture of politic-economic actors manifests with regard to the adoption of renewable energy technologies. Using the document analysis, we identified key energy reforms attempts and policy debates, explored both socio-technical and political responses and examined whether the outcomes of these reforms were in tandem with our theoretical expectations. Based on this, we were able to chronologically provide an overview of Nigeria’s energy system, explore its current need for transitions, identify socio-technical and politico-economic actors as well as present their role in transitions from a historical perspective. Furthermore we examined attempts to introduce renewables as an alternative energy source, strategies employed in negotiating transitions and a summary of its influence on Nigeria’s transitions trajectory.

4. The case of Nigeria

As mentioned above, we have selected Nigeria as our case study because of its special characteristics as a Southern rentier state with a political and economic system that is largely influenced by, and dependent on, fossil energy sources. In the last decade, over 30% of new oil and gas discoveries worldwide have been made in Sub-Saharan Africa, with Nigeria accounting for the highest percentage (IEA, 2014). Nigeria is not only the largest economy in Africa, but it also holds vast fossil energy resources, including an estimated 37.1 million barrels of crude-oil reserves and over 5.1 trillion cubic meters of natural gas (British Petroleum, 2015). Despite these seemingly large oil and gas resources, the country has not been able to meet its own energy demands. Fifty-five per cent of the population lack access to electricity, and more than 80% still rely on traditional

Table 1. Similarities between existing MLP strategies and rentier strategies.

Stenzel and Frenzel (2008)	Smink et al. (2015)	Murphy et al. (1993) Commander (2012)
Defensive	Defensive institutional work	Defensive/Political capture of rent
Reactive	Information strategy/scientific research Communication	Discourse
Proactive	Standardization	Institutional/structural

biomass for energy consumption (IEA, 2014). Importantly, less than 20% of those connected to the grid have access to stable electricity supply (at the maximum 12–15 hours per day) (Foster & Pushak, 2011; IEA, 2014). This situation has therefore led to the proliferation of off-grid petroleum and diesel-powered generators. Current import figures of these off-grid generators have been pegged at 17.9 billion naira (Ley, Gaines, & Ghatikar, 2014; Power Sector, 2012). Potentially, however, Nigeria has all the resources to initiate an energy transition that would reduce its dependence on fossil fuels. On one hand, the country is rich in hydro-resources, which currently account for 29% of energy generation and distribution. In addition, and concerning solar energy, Nigeria receives an estimated amount of 4909.213 kWh of solar energy, which equals 1082 million tons of crude per day (Dayo, 2008). Furthermore, Nigeria is rich in biomass with resources which can be converted to energy; 228,400 tons of animal waste are produced per day, which if processed could yield 6.7 million cubic meters of bio-gas (Akinbami, Ilori, Oyebisi, Akinwumi, & Adeoti, 2001). Yet despite these opportunities, renewable technologies have been unable to permeate the energy regime or to propel the needed transition. Indeed, only a few Nigerian states – mainly Lagos, Sokoto, Delta, Oyo, Bauchi and Enugu – have significantly deployed renewable energy technologies in lessening their electricity burdens. In addition, renewable energy research centres have struggled with financing and technological know-how while renewable energy start-up companies face severe market constraints (Interview with senior academic 1). Why is this the case? The following sub-section explores reasons behind the failure of niches and landscapes in successfully influencing Nigeria's socio-technical energy regime.

4.1. Interactions between Nigeria's socio-technical energy regime and the politico-economic regime

In essence, the socio-technical energy regime in Nigeria is a very rigid, complex and centralized system controlled by the Presidency, the National Executive Council (NEC), and the federal ministries of Petroleum Resources and of Power. Other important regime members include the federal ministries of Mines and Steel, Science and Technology, and Environment. Sub-regime members within the energy system can be grouped into four categories, namely the petroleum and gas category; the power generation category; the research and technology development category; and the end user category.

Nigeria's socio-technical energy regime is best described by rentierism — mainly because major actors within the socio-technical regime are active collaborators with members of the politico-economic regime through shared platforms of interactions such as clubs, industry associations and political parties. Furthermore the establishment of bureaucratic institutions by politico-economic actors such as specialized energy agencies managed by socio-technical actors for regulatory purposes serve as channels of rent redistribution

The politico-economic regime in the country strongly revolves around the central government (which has, however, a role that is more linked to rentierism than in advanced industrialized countries); the rent-seeking political parties; the rent-seeking past and present top military generals, and other actors linked to the shadow economy (e.g. money laundering organizations). In general, energy development (notably electricity expansion and crude-oil refinement) was front and centre on the country's agenda during its 33 years of military rule, especially through restructuring and creating new energy enterprises and companies (Idris, Kura, Ahmed, & Abba, 2013; Okoro & Chikuni, 2007). However, the energy sector still suffered huge setbacks due to corrupt practices (Okoro & Chikuni, 2007). Under this centralized political structure, a fossil-dependent socio-political system was created, which increased the thirst for oil rent at national, regional and local levels (Gillies, 2009).

Thus, when in 1999 a new democratic regime dawned under the leadership of former President Olusegun Obasanjo, it inherited both a fragile state and a political economy affected by international trade imbalances due to the high dependence on oil. In addition, the functional capacity of energy utilities was limited, administratively crippled by inefficiency and debts, with some parastatals in the energy sector having run for years without financial audits (Interview with Decision Maker 1, 2014). All this ultimately shaped the Obasanjo-led government's implementation of the International Monetary Fund's (IMF) and the World Bank's neoliberal recommendations (Ekanade, 2014). The new regime led to several changes in how rentier actors interacted within the energy sector, including the emergence of new blocs of corporate elites, the 'financialization' and liberalization of the energy sector, a more vocal role for oil interests, the emergence of electricity and labour

associations and a realignment from a dominant militarily controlled system to a stylized democratic yet largely authoritarian liberalism (Interview with Decision Maker 2, 2014). This new wave of liberalisation also created unprecedented levels of corruption, increased levels of dereliction of duty by public servants, and a surge in bureaucratic patronage (what is known as ‘*egunje*’ in Nigeria, meaning bribery. See Ijewereme, 2015). As part of the liberalisation process, by the end of the regime in 2007 around 16 billion USD had been invested in the revitalization of the electricity sector (Ekanade, 2014). This liberalisation resulted in the generation of 4000 MW of thermal powered electricity but brought no meaningful increase in energy access and electrification rate.

Since the emergence of democratic rule in 1999, policies on energy generation taken by political institutions became central political arenas and altered the distribution of resources, rules and interests by constructing new actors and identities, such as independent power producers (Ley et al., 2014). Such policies included most prominently the continual push for the introduction of the petroleum industrial bill since its initial development in 2001, which – although positioned as a regulatory bill – is expected to reinforce Nigeria’s dependence on crude resources as well as increase current regime members’ interests in oil and gas investment (Heller, 2009). Debate on the Senate floor positioned this bill as the most important to be passed in Nigeria between 2013 and 2014 due to strategic push by lobbying interests (Premium Times Nigeria, 2013). As such, the predominance of such fossil fuel policies led to an almost complete overlook of renewable energy (Dayo, 2008). In addition, through the government-controlled energy system, political regime members successfully created rules for energy generation by bequeathing individuals within their party hierarchy with authority and other resources for continued exploration of fossil resources. For example, a number of energy contracts at federal, state and local levels between 1999 and 2015 were allocated to party members (Ijewereme, 2015; Olarinmoye, 2008). The authority proscribed to these political actors in turn created a rigid energy system that niche developers were unable to penetrate even when they exert pressure on the regime. For example all top-level university experts, interviewed anonymously for this study, unanimously had the same opinion that, whenever the government is approached with proposals for renewable energy contracts, they were often told that ‘their technology isn’t viable on a large scale’. Finally, while Nigeria is the 11th oil-exporting nation in the world (British Petroleum, 2015), more than 70% of oil or refined petroleum consumed locally is imported. Rentier actors benefit enormously also from the sale of imported petroleum products (Iman & Edozie, 2015). In addition, oil importers and distributors also own large shares of off-grid powered generators. Hence for these actors, domestic oil dependence, fossil subsidies and limitedly functional electricity system is a win-win situation.

4.2. Strategies of political and economic actors to prevent transitions

By applying the theoretical framework, our analysis reveals three strategies that rentier regime members in Nigeria employ in blocking transitions: defensive strategies; discursive strategies; and the strategic use of structural or institutional resources. These we explain in some detail below.

4.2.1. Defensive political strategies

We observed the use of three defensive political strategies by rentier actors in blocking attempts at transitions in Nigeria.

- (a) *Privatization of energy generation systems.* First, we observe privatization and sales of energy generation systems to independent power producing companies owned either by members of the ruling political party or by active or retired senior army officers. A prime example is the reformed Power Sector Roadmap of 2010 (Power Sector, 2012), which led to the privatization and sale of the Power Holding Company of Nigeria. Government-released records show that this former public company was sold to other companies owned by former generals, who were also members of the ruling political party (Brock, 2012; Izuora & Akwaja, 2014). These groups of actors are also the largest importers of diesel and petrol generating sets, which is a cheaper short-term alternative for Nigerian consumers (Izuora & Akwaja, 2014). While initial governmental ownership of energy generation systems was unsustainable, privatization also created

opportunities for rent-seeking politicians and bureaucrats to pursue their self-interested agendas and maximize their private financial gain (Brock, 2012).

- (b) *Corruption*- the relationship between the oil industry and government representatives explains why governmental officials hand out concessions to oil corporations (Gillies, 2009; Ijewereme, 2015). An example of this is the appointment in 2011 of Diezani Alisson Madueke, a former director of Shell Petroleum Development Company of Nigeria, as Minister for Petroleum Resources. Importantly, members of the oil and gas industry strengthen such relationships through financial donations to political parties, allowing them to influence the emergence of political office holders that are willing to maintain the status quo. For instance, in the last two elections in Nigeria (2011 and 2015), the major contributors to the campaign fund of former President Goodluck Jonathan were members of the oil and gas importers' association, former military heads of states, as well as corporate elites associated with the energy and electricity sector. Ahead of the 2015 election, it was publicly declared that out of the 21.7 billion Naira donated towards the presidential campaign, the largest share (approximately eight billion Naira), was cumulatively donated by the oil and gas and power sectors (Sotubo, 2014). Significantly, this explains how these actors have been able to influence government decisions between 2011 and 2015 to favour the expansion of oil and gas resources in Nigeria. It also explains the non-prosecution by the Jonathan government of corrupt oil marketers in a fuel subsidy scandal (Channels Television, 2012) and further proliferation of corruption within the energy system perpetrated through awards of bogus energy contracts to governmental officials and shadow organizations.
- (c) *Creation of artificial energy scarcity*- rentier regime members in Nigeria often resort to the creation of artificial energy scarcity or socially produced scarcity, hence triggering panic purchases (in this case, oil). In the last decade, Nigeria experienced over 26 episodes of fuel scarcity that lasted weeks. These episodes are largely tied to oil importers and independent marketers, who hoard supplies and divert oil into black markets for higher profit (Omisore, 2014). This immediately creates panic purchases, with citizens facing long queues and often a general shutdown of economic and social activities. A recent example was the indefinite strike by oil importers and marketers a week before a change of government in May 2015. All business activities were shut down, and the entire country experienced severe blackouts (BBC Africa, 2015).

4.2.2. Discursive strategies

We observed the use of discursive strategies, such as public debates or symposiums in reinforcing and steering public sentiments of indigenous claims to fossil forms of energy.

- (a) *Use of media framing*- at the government level, rentier actors have either been very subtle in their opposition to the emergence of renewable energy technologies as the dominant form of electrification in Nigeria or have been directly vocal in their opposition of it. For instance, in October 2014, the former Minister of Power Ositadinma Nebo said during a major US-Africa summit,

While solar is gaining parity when compared with other conventional sources and can help meet the gap for communities outside the national grid, nevertheless the Nigerian government would still rely heavily on coal and natural gas for grid power generation in the next decades. We have no doubt on the potentials of clean coal technology which can simultaneously provide adequate electricity with the barest pollution. (King, 2014)

Similarly, in December 2014, the governor of Ekiti state in Nigeria in an interview with a national newspaper argued that solar energy was not a viable option for his state, as this was a wasteful investment (Abiola, 2014).

- (b) *Influencing public debates through symposia*- this stance was echoed by a keynote speaker, Prof. Joseph Olorunfemi Ojo, at a Nigerian Academy of Engineering summit in 2015, who argued that 'solar power

is not a viable alternative, considering its cost, and the fact that no country can solely run on it' (Ebuzor, 2015). These sentiments were equally visible in a recent survey conducted by a national energy consultant on public appeal towards the use of solar energy in Nigeria. The data showed that Nigerians perceive Solar PV as being too far from grid parity, extremely expensive, needing some advanced technology support to be viable, and unable to provide a 24-hours supply of energy (Owoeye, 2014). Finally, top decision-makers in states like Lagos and Sokoto demonstrating a niche experimentation (see section 3) argued that 'renewable energy such as solar is only good for small lighting and small scale energy generation and that is why in their respective states solar is only considered for street-lighting'.

4.2.3. Strategic use of structural or institutional resources

We found that rentier actors in Nigeria engaged in the use of structural or institutional resources, including privileging technologies, rebranding existing energy systems (electricity, oil and gas), or institutionalizing extra subsidies for these energy systems.

- (a) *Modification of environmentally degrading technologies.* Coordinated attempts by regime members in resisting energy transition in Nigeria have been through the modification of environmentally degrading technologies as alternatives for renewable energy. Examples include the introduction of gas turbines and the importation of diesel generator sets. In the last decade, diesel generator sets have been imported at cheap prices as part of a pro-poor development agenda, with current import figures estimated to be around 17.9 billion Naira (Ley et al., 2014). In addition, 60% of companies in Nigeria are currently estimated to have their own generators for electrification (Foster & Pushak, 2011). Nigerian citizens, on the other hand, have been estimated to spend over nine million USD annually on fuel consumption. Currently, natural gas accounts for 31% of energy consumed in Nigeria (IEA, 2017). These energy technologies were introduced as 'niches' for two reasons: first, incumbent members of the energy regime perceived a significant threat to the stability, goals and interests of the regime, that is, clientelist activities around oil rent; and second, they offered a new market opportunity for the continual use of crude oil. The paradox here is that the Power Holding Company of Nigeria sometimes powers its offices across the nation with these new 'niche' (generator sets) technologies. It might be possible to see the use of gas turbines and diesel generators as a means of curtailing energy shortages as well as improving energy access, combined with a move away from dirty and heavy crude oil. However, in reality, these technologies largely reinforce the use of fossil fuels.
- (b) *Provision of subsidies.* Second, regime actors have fiercely resisted transitions through the provision of subsidies (double subsidies on petroleum and electricity) to the existing energy system as part of a 'cradle-to-grave service'. This has created a societal bond that strongly supports the production and use of fossil fuels. Between 2010 and 2011, the government spent approximately 2.5 trillion Naira on the provision of consumer oil subsidies, making the cost of petroleum products cheaper compared with renewables (IISD, 2012). Based on the availability of fuel subsidies, Nigerians consume on average about 33 million litres of petroleum products daily, which limits the penetration of renewable energy technologies (Gillies, 2009; IISD, 2012). Particularly rentier actors have situated the overt consumption of oil as an alternative solution to the electricity problem. Based on the enormous benefits accrued from fuel subsidies, these actors also ensure that fuel consumption becomes a daily 'staple' if compared with food among the Nigerian population. Finally, Nigeria's domestic gasoline price is the cheapest in West Africa, owing to the aforementioned substantial subsidies. With the proliferation of fuel subsidies, the politico-economic regime in Nigeria maintains its grip on the energy system while blocking new niches or inward regime invasion. In sum, in Nigeria, the transition to more renewable energy deployment has been stalled due to its political system that is dominated by widespread rentierism and the strong networks of actors who benefit from this.

The analysis presented above demonstrates that to be able to explain the (lack of) renewable energy transitions in non-OECD countries, specifically rentier states, the MLP theory needs to be 'enriched' to account

for the rentier character of the state. Although existing and emerging literature on the MLP have begun to take political economy into account while also pointing to the use of defensive, reactive, proactive strategies in blocking transitions, these strategies have been mainly developed to explain the relationship between firms and government (Konrad, Markard, Ruef, & Truffer, 2012; Smink et al., 2015; Stenzel & Frenzel, 2008). In light of this, our framework (Figure 1) makes three main improvements: first, it redirects the attention away from traditional conceptualization of spaces of transitions. In this regard, rather than focusing on sectoral analysis, this framework examines the political architecture and explores how structures and practices within the entire political system influence transitions. Second, the framework helps to bring to fore and integrate new actors that have been mostly relegated in transitions studies (see Avelino & Wittmayer, 2016). In this regard, we move beyond previously analysed organisational, institutional and industry actors and focus on political actors, informal institutions and the military. Our focus on this category of actors reveals how they create spaces of interactions with socio-technical actors. Such spaces include political party platforms, industry associations and informal professional clubs. Through these platforms, politico-economic actors are able to leverage material and financial resources in conditioning the activities of socio-technical actors, their rules and organisational structure in order to maintain the status quo. Importantly unlike incumbents, niches have no longstanding lobbying allies; neither do they belong to government elite clubs. They are therefore more susceptible to political barriers.

Finally, our framework highlights how spaces of interactions shared by socio-technical and politico-economic actors help breed strategies targeted at blocking transitions. This is in line with an original assumption of the MLP, which argues that socio-technical actors have the capacity to use 'reactive' or 'proactive' strategies in blocking the emergence of new technologies (Stenzel & Frenzel, 2008). Nonetheless, our focus on rentier states suggest that three main strategies were prominently employed by rentier regime members in influencing public policy at the expense of RETs: defensive strategies, discursive strategies and strategies that rely on the use of structural or institutional resources. Importantly, politico-economic actors were the main users of these strategies with socio-technical actors playing the role of implementers. Using these strategies, rentier regime members are able to block transition spaces even when alternative niches might otherwise have developed. As the case of the Minister of Power highlights, renewable technologies were supported but only as part of a programme for those communities that were out of reach of the grid. For large-scale national planning, however, renewables were deemed unfit by the Minister. Thus, although, the combination of MLP and rentier theories has yielded new knowledge about resistance against renewable energy, specifically for rentier developing countries, further research in this direction is needed to provide better insights into what countervailing green strategies might be able to break rentier holds in transitions.

5. Conclusion

This study shows that rentier incumbents through energy patronage networks employ a number of strategies when faced with transition attempts that challenge their vested interests. We argued that the literature on political economy and rent provides useful knowledge in this regard. Specifically, this literature allowed us focus on political structures, interests and institutions outside the current scope of a socio-technical regime. As a consequence, we propose an integrated framework, a politico-economic perspective, which calls for more attention to the politics of energy transitions, and provides a political overview that reflects the influence of the political system on transition processes. In Nigeria, such a political system is built on heavy reliance on fossil fuels and the client-patron relationships between political elites and major economic interests against the backdrop of a relatively poor and uninformed society. In this context, it will take much more than the development of niches to create the conditions necessary for transitions to occur. As such, we posit that future studies within the MLP should pay more attention to the political intricacies of socio-technical transitions as this potentially shapes transitions trajectories at national levels.

Note

1. See video by Shell corporation making a comparison between the unreliability of renewables and women, prior to the 2015 Paris agreements: <http://energydesk.greenpeace.org/2015/11/27/shell-video-gas-renewables-women/>.

Disclosure statement

No potential conflict of interest was reported by the authors.

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References

- Abiola, A. (2014, December 17). Ekiti's investment in solar energy wasteful. *Leadership Newspaper*. Retrieved from <http://leadership.ng/news/395802/ekitis-investment-solar-energy-wasteful-fayose>
- Akinbami, J.-F. K., Ilori, M. O., Oyebisi, T. O., Akinwumi, I. O., & Adeoti, O. (2001). Biogas energy use in Nigeria: Current status, future prospects and policy implications. *Renewable and Sustainable Energy Reviews*, 5(1), 97–112. doi:10.1016/S1364-0321(00)00005-8
- Avelino, F., & Wittmayer, J. M. (2016, December). Shifting power relations in sustainability transitions : A multi-actor perspective. *Journal of Environmental Policy & Planning*, 18, 628–649. doi:10.1080/1523908X.2015.1112259
- Baker, L., Newell, P., & Phillips, J. (2014, August). The political economy of energy transitions: The case of South Africa. *New Political Economy*, 19, 791–818. doi:10.1080/13563467.2013.849674
- BBC Africa. (2015). Nigeria fuel shortage cripples businesses, banks and flights. *BBC Africa*. Retrieved from <http://www.bbc.com/news/world-africa-32873349>
- Beblawi, H. (1987). The Rentier State in the Arab World. *Arab Studies Quarterly*, 9(4), 383–398. Retrieved from <http://www.jstor.org/action/showPublisher?publisherCode=plutojournals>
- British Petroleum. (2015). *BP statistical review of world energy June 2015*. Retrieved from <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:BP+Statistical+Review+of+World+Energy#0>
- Brock, J. (2012). Insight: Murky deals cast doubt over Nigeria's power sell-off. *Reuters*. Retrieved from <http://www.reuters.com/article/us-nigeria-power-idUSBRE89K07M20121022>
- Channels Television. (2012). *AUDIO: The \$3 million conversation between Farouk Lawan and Femi Otedola*. Nigeria: Channels Television. Retrieved from <http://www.channelstv.com/2012/08/03/the-3-million-conversation-between-farouk-lawan-and-femi-otedola/>
- Commander, S. (2012). *A guide to the political economy of reforming energy subsidies*. IZA Policy Paper, No. 52. Retrieved from <http://hdl.handle.net/10419/91797Nutzungsbedingungen>

- Dayo, F. B. (2008). Clean energy investment in Nigeria: The domestic context. *International Institute for Sustainable Development*, 1. Winnipeg. Retrieved from https://www.iisd.org/pdf/2008/cei_nigeria.pdf
- Decision Maker 1. (2014). Interview conducted in person on 10 March 2014.
- Decision Maker 2. (2014). Interview conducted in person on 25 March 2014.
- Ebuzor, C. (2015). Nigerian engineers say solar power is not a viable option. *Pulse Nigeria*. Retrieved from http://pulse.ng/real_estate/renewable-energy-nigerian-engineers-say-solar-power-is-not-a-viable-option-id3932114.html
- Ekanade, O. V. (2014). The dynamics of forced Neoliberalism in Nigeria since the 1980s. *Journal of Retracing Africa*, 1(1), 1–24.
- Financial Nigeria. (2016, August 31). GDP data confirms Nigeria is in recession. *Financial Nigeria*. Retrieved from <http://www.financialnigeria.com/gdp-data-confirms-nigeria-is-in-recession-news-818.html>
- Foster, V., & Pushak, N. (2011). *Nigeria's infrastructure: A continental perspective*. Washington. Retrieved from <http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-5686>
- Fouquet, R., & Pearson, P. J. G. (2012). Past and prospective energy transitions: Insights from history. *Energy Policy*, 50, 1–7. doi:10.1016/j.enpol.2012.08.014
- Geels, F. W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions*, 1(1), 24–40. Elsevier B.V. doi:10.1016/j.eist.2011.02.002
- Geels, F. W. (2014). Regime resistance against low-carbon transitions: Introducing politics and power into the multi-level perspective. *Theory, Culture & Society*, 31(5), 21–40. doi:10.1177/0263276414531627
- Gillies, A. (2009). *Reforming corruption out of Nigerian oil?* Bergen. Retrieved from <http://www.cmi.no/publications/file/3295-reforming-corruption-out-of-nigerian-oil-part-one.pdf>
- Grin, J., Rotmans, J., & Schot, J. (2011). On patterns and agency in transition dynamics: Some key insights from the KSI programme. *Environmental Innovation and Societal Transitions*, 1(1), 76–81. Elsevier B.V. doi:10.1016/j.eist.2011.04.008
- Grubler, A. (2012). Energy transitions research: Insights and cautionary tales. *Energy Policy*, 50, 8–16. Elsevier. doi:10.1016/j.enpol.2012.02.070
- Heller, P. (2009). The Nigerian petroleum industry bill?: Key upstream questions for the national assembly. *Revenue Watch Institute*. Retrieved from http://archive.resourcegovernance.org/sites/default/files/RWI_Nigeria_PIB_Analysis.pdf
- Hess, D. J. (2014). Sustainability transitions: A political coalition perspective. *Research Policy*, 43(2), 278–283. Elsevier B.V. doi:10.1016/j.respol.2013.10.008
- Idris, A., Kura, S. M., Ahmed, M. A., & Abba, Y. (2013). An assessment of the power sector reform in Nigeria. 3(1), 23–26. doi:10.5923/j.economics.20130301.05
- IEA. (2014). *Africa energy outlook. A focus on energy prospects in Sub-Saharan Africa*. Retrieved from <https://www.iea.org/publications/freepublications/publication/africa-energy-outlook.html>
- IEA. (2017). *Nigeria: Balances for 2014*. Retrieved June 1, 2017, from <https://www.iea.org/statistics/statisticssearch/report/?country=Nigeria&product=balances>
- IISD. (2012). *A Citizen's guide to energy subsidies in Nigeria*. Retrieved from https://www.iisd.org/gsi/sites/default/files/ffs_nigeria_czguide.pdf
- Ijewereme, O. B. (2015). Anatomy of corruption in the Nigerian public sector: Theoretical perspectives and some empirical explanations. *SAGE Open*, 5(2). doi:10.1177/2158244015581188
- Iman, N., & Edozie, V. (2015). How oil thieves, cabal milk Nigeria dry. *Daily Trust Nigeria*. Retrieved from <http://www.dailytrust.com.ng/sunday/index.php/investigation/21406-how-oil-thieves-cabal-milk-nigeria-dry>
- Izuora, C., & Akwaja, C. (2014). Faces behind privatised electricity industry. *Leadership Newspaper*. Retrieved from <http://leadership.ng/features/359169/faces-behind-privatised-electricity-industry-2>
- Kern, F., Gaede, J., Meadowcroft, J., & Watson, J. (2016). The political economy of carbon capture and storage: An analysis of two demonstration projects. *Technological Forecasting and Social Change*, 102, 250–260. Elsevier Inc. doi:10.1016/j.techfore.2015.09.010
- King, E. (2014). Nigeria energy minister backs solar for rural communities says country will invest in coal and gas power for national grid to combat Urban blackouts. *Climate Home*. Retrieved from <http://www.climatechangenews.com/2014/08/05/nigeria-energy-minister-backs-solar-for-rural-communities/>
- Konrad, K., Markard, J., Ruef, A., & Truffer, B. (2012). Strategic responses to fuel cell hype and disappointment. *Technological Forecasting and Social Change*, 79(6), 1084–1098. Elsevier Inc. doi:10.1016/j.techfore.2011.09.008
- Ley, K., Gaines, J., & Ghatikar, A. (2014). *The Nigerian energy sector – an overview with a special emphasis on a special emphasis on renewable energy, energy efficiency and rural electrification*. GIZ. Retrieved from <https://www.giz.de/en/downloads/giz2015-en-nigerian-energysector.pdf>
- Meadowcroft, J. (2011). Engaging with the politics of sustainability transitions. *Environmental Innovation and Societal Transitions*, 1(1), 70–75. Elsevier B.V. doi:10.1016/j.eist.2011.02.003
- Murphy, K. M., Shleifer, A., & Vishny, R. (1993). Why is rent-seeking so costly to growth? *The American Economic Review*, 83(2), 409–414. doi:10.2307/2117699
- Musawa, H. (2016, February 13). “Crude oil– bane of Nigeria’s economic growth.” *The Nation*.
- Normann, H. E. (2015). The role of politics in sustainable transitions: The rise and decline of offshore wind in Norway. *Environmental Innovation and Societal Transitions*, 15, 180–193. Elsevier B.V. doi:10.1016/j.eist.2014.11.002

- Okoro, O. I., & Chikuni, E. (2007). Power sector reforms in Nigeria?: opportunities and challenges. *Journal of Energy in Southern Africa*, 18(3), 52–57.
- Olarinmoye, O. O. (2008, December). “Godfathers, political parties and electoral corruption in Nigeria. *African Journal of Political Science and International Relations*, 2(4), 66–73.
- Omisore, B. (2014, April 11). *Nigerians face fuel shortages in the shadow of plenty*. Abuja. Retrieved from <http://news.nationalgeographic.com/news/energy/2014/04/140411-nigeria-fuel-shortage-oil/>
- Owoeye, O. (2014). *Mistaken beliefs about solar PV system viability by Nigerians and their root causes*. Retrieved from <https://www.linkedin.com/pulse/20140702164247-183657447-mistaken-beliefs-about-solar-pv-system-viability-by-nigerians-and-their-root-causes>
- Power Sector. (2012). *Nigeria Power Guide*. Vol. 1.
- Premium Times Nigeria. (2013). Nigerian senators split along north, south divide over PIB. *Premium Times Nigeria*. Retrieved from <http://www.premiumtimesng.com/news/123229-nigerian-senators-split-along-north-south-divide-over-pib.html>
- Raven, R., Kern, F., Verhees, B., & Smith, A. (2015). Niche construction and empowerment through socio-political work. A meta-analysis of six low-carbon technology cases. *Environmental Innovation and Societal Transitions*. Elsevier B.V. doi:10.1016/j.eist.2015.02.002
- Reiche, D. (2010). Energy policies of Gulf Cooperation Council (GCC) countries – possibilities and limitations of ecological modernization in Rentier States. *Energy Policy*, 38(5), 2395–2403. Elsevier. doi:10.1016/j.enpol.2009.12.031
- Rolfs, P., Ockwell, D., & Byrne, R. (2015). Beyond technology and finance: Pay-as-you-go sustainable energy access and theories of social change. *Environment and Planning A*, 47(12), 2609–2627. doi:10.1177/0308518X15615368
- Rosenbloom, D., & Meadowcroft, J. (2014, February). The journey towards decarbonization: Exploring socio-technical transitions in the electricity sector in the province of Ontario (1885–2013) and potential low-carbon pathways. *Energy Policy*, 65, 670–679. doi:10.1016/j.enpol.2013.09.039
- Salame, G. (1994). *Democracy without democrats?* London: I.B. Tauris.
- Schmitz, H., Johnson, O., & Altenburg, T. (2013). *Rent management – the heart of green industrial policy*. 418. Vol. 2013. Brighton.
- Schot, J., & Geels, F. W. (2008). “Strategic niche management and sustainable innovation journeys: Theory, findings, research agenda, and policy”, 37–41. doi:10.1080/09537320802292651
- Smink, M. M., Hekkert, M. P., & Negro, S. O. (2015). *Keeping sustainable innovation on a leash?* Exploring incumbents’ institutional strategies. *Business Strategy and the Environment*, 24(2), 86–101. doi:10.1002/bse.1808
- Smith, A., & Stirling, A. (2010). The politics of socio-ecological resilience and socio-technical transitions. *Ecology & Society*, 15(1), 1–13.
- Sotubo, J. (2014, December 21). These are the people who contributed N21.27bn for Jonathan’s campaign. *Pulse Nigeria*. Retrieved from <http://pulse.ng/politics/gej-2015-these-are-the-people-who-contributed-n21-27bn-for-jonathan-s-campaign-id3362917.html>
- Stenzel, T., & Frenzel, A. (2008). Regulating technological change-the strategic reactions of utility companies towards subsidy policies in the German, Spanish and UK electricity markets. *Energy Policy*, 36(7), 2645–2657. doi:10.1016/j.enpol.2008.03.007
- Torvanger, A., & Meadowcroft, J. (2011). The political economy of technology support: Making decisions about carbon capture and storage and low carbon energy technologies. *Global Environmental Change*, 21(2), 303–312. doi:10.1016/j.gloenvcha.2011.01.017
- Ulsrud, K., Winther, T., Palit, D., Rohracher, H., & Sandgren, J. (2011). The solar transitions research on solar mini-grids in India: Learning from local cases of innovative socio-technical systems. *Energy for Sustainable Development*, 15(3), 293–303. International Energy Initiative. doi:10.1016/j.esd.2011.06.004