



Original Research Paper

Transitions in unlikely places: Exploring the conditions for renewable energy adoption in Nigeria

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ABSTRACT

This paper examines conditions and pathways that explain variation in the adoption of renewable energy (RE) in Nigeria's 36 states based on a fuzzy set qualitative comparative analysis. Using three analytical lenses proposed by the multi-level socio-technical theory (niches, regimes, and landscapes), we examine RE adoption in these states. While all three lenses explain variation to some extent, a combination of regime and landscape characteristics, enables states to overcome dependence on oil while triggering the adoption of RE. States with high income and a regime featuring institutions and coalitions supporting transitions establish themselves as pioneers. States with medium/low income and a regime characterised by a weak pro-RE political coalition support emerge as laggards. Hence we conclude that the role of the regime and particularly political actors therein, is central in energy transition processes among Nigerian states. This has implications for future transition attempts in Nigeria and developing (rentier) countries, generally.

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1. Introduction

Several attempts have been made at global and regional levels, in recent years, to promote renewable energy transitions in Africa. While some of these efforts have targeted renewable energy financing, others have been designed to promote policy cohesion and data reporting at national levels. Examples include the Economic Community for West African States (ECOWAS) Centre for Renewable Energy and Energy Efficiency (ECREEE), the Africa-EU Energy Partnership (AEEP) and the Africa-EU Renewable Energy Cooperation Program (RECP). These initiatives have provided countries in Africa with renewable energy finance and data on latest market developments and trends,—all of which are directed at increasing policy cohesion at regional and national levels. Accordingly, renewable energy investments in Africa have increased tenfold, from US\$500 million in 2004 to US\$9 billion in 2013 (REN21, 2014).

Nigeria has not been left out in the pursuit of renewable energy although it is an oil exporting nation with 70% of its income linked to extraction and exploration of fossil fuels (crude oil) (Bala-Gbogbo, 2015). Currently, Nigeria produces an estimated 1.4 million barrels per day (bpd) with a crude reserve of 37.1 billion barrels (Holodny, 2016). Despite its vast fossil fuel resources, Nigeria is still unable to meet its energy demands due to its low refining capacity with crude refining being pegged as low as 20% run rate. Hence, 80% of domestically consumed petroleum products in Nigeria are imported (IEA, 2014).

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In addition, more than 60% of Nigeria's population lacks access to electricity (Ley et al., 2014). However, emerging trends suggest an ongoing transition within the energy sector in Nigeria. Prominent examples include, for instance, solar and bio-gas adoption by communities in Lagos, Delta and Sokoto. Two factors make this change particularly interesting: (a) Nigeria's dominant energy system which is heavily reliant on fossil fuels has been limitedly functional over the years, triggering demand for alternative sources of energy; and (b) the shift towards the adoption of renewable energy is not mainly driven by the federal government but by state governments, private corporations and community initiatives. However, there is remarkable variation in the adoption of renewable energy among the thirty-six states in Nigeria. While some are championing renewable energy through collaborative investments, research and the development of regulatory mechanisms, others are still heavily dependent on fossil fuels for economic growth and development.

To understand these dynamics of transition, this paper pursues the following research questions: why are some states within the same country (Nigeria) pioneers and others laggards in the adoption and development of renewable energy? Which factors explain this variation? And how can a sustainable energy transition process be more widely adopted in Nigeria?

In evaluating the transition to renewable energy in Nigeria we examine the scale of renewable energy adoption in each of its thirty-six states on the basis of a variable commonly used in the literature on energy transitions: the installed capacity of renewable energy technologies. In turn, our analysis of the variation in the installed capacity of renewable technologies among the Nigerian states is based on the three analytical lenses derived from the multi-level-socio-technical perspective (MLP).

The MLP explains transitions based on the interaction between “niches”, “regimes” and pressure from “landscapes”. Building on this, we hypothesise that renewable energy adoption is a product of niche experimentation, regime characteristics and landscape influences. While research in this field to date has focused on the complementary nature of these three levels among industrialized countries (Mazur et al., 2015) or on their independent influence on transitions, (Lawhon and Murphy, 2012; Lopolito et al., 2011; Raven, 2007; Smith and Raven, 2012), in this paper we try to understand which level is more prominent in explaining the current state of renewable energy adoption in a developing and rentier country like Nigeria.

Accordingly, this paper contributes to the knowledge and understanding of transitions in an understudied part of the world where conditions for transitions may differ substantially in relation to those present in the global North where the majority of transition research has been conducted to date (McCauley and Stephens, 2012; Wangel et al., 2013). It, thus, contributes to the currently scarce but growing literature of energy transitions in the global South (Baker et al., 2014; Lawhon, 2012; Rolffs et al., 2015; Wieczorek et al., 2015), rentier countries (Atalay et al., 2016), and communities within a country (Seyfang et al., 2014; Yildiz et al., 2015). More specifically, an analysis of energy transitions in Nigerian states offers multiple insights on: (i) the role of local political actors and coalitions in the transition processes; (ii) the strategies employed by different actors in coordinating a push towards energy transitions; and (iii) a contribution to the on-going debates within the MLP on the role of politics and regime characteristics in transitions. Understanding this latter point is particularly important as previous studies (Normann, 2015; Elzen et al., 2011) argue that for transitions to be successful there must be a cogent alignment of technological substitution and political keenness.

This study is mainly qualitative and offers original empirical data on the latest technological and scientific advancements in Nigeria and the factors which explain these advancements and their variation. Data was collected on the basis of an extended literature review, policy documents such as the Renewable Energy Master Plan, the Feed-in Tariff draft and the revised draft of Nigeria's Energy Policy.

For information on oil revenues, we juxtaposed figures from governmental sources (the Ministry of Finance, the National Bureau of Statistics (NBS), Budget and websites of numerous state governments), media news stories, and energy reports. Key informant interviews were conducted with a total of ten experts from energy ministries and agencies, renewable energy research centres in Nigeria and financial institutions during the first quarter of 2014. Although this appears as a top down approach, interviews were limited to a select group of experts due to the fact that most projects identified were largely state sponsored or projects created through collaboration with state actors and inter-governmental organisations splintered across cities and rural areas of the relevant states.

In addition, it was not possible to conduct large surveys because some states became high risk states due to insurgencies during the research period. Likewise, availability of data on consumer use of renewables was limited. While we acknowledge these limitations, our analysis still provides valuable insights on current renewable energy projects and actors involved as we were able to interact with both policy makers and consumers at formal and informal levels to understand their stance on the diffusion of renewable energy at the state and local levels. The paper is structured as follows: Section 2 briefly discusses the multi-level socio-technical theory and presents our hypotheses. Section 3 presents the methodological approach to this study. Section 4 provides and discusses the empirical results. We conclude in Section 5 with insights for science and policy on the application of the MLP in Nigeria, and identify future research prospects.

2. Theoretical context

The multi-level socio-technical perspective (MLP) explains the dynamics between technology, institutions, norms, markets and society. The framework has been significant in analysing changes and stability in socio-technical systems, i.e. linkages between technological artefacts, social and cultural elements and how these transform to long-term development (Geels, 2002). The literature on MLP divides energy transitions across three different levels. The micro level is the “niches”,

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