Bridging the divide? Integrating stakeholder values into energy system models

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Delivering just energy transitions in sub-Saharan Africa requires careful planning and consideration of diverse objectives. Baker et al. provide a useful method for eliciting stakeholder preferences in Ghana but fail to illustrate how this evidence may be integrated into quantitative energy models.

The provision of access to affordable and clean energy for all remains central to sustainable development. The United Nations' Sustainable Development Goal (SDG) 7 sets a global ambition to ensure "access to affordable, reliable, sustainable and modern energy for all" by 2030. Although well-articulated, progress toward achieving the SDG7 ambition has remained elusive for many countries in sub-Saharan Africa (SSA). While significant progress has been made in other parts of the globe, 53% of SSA's population remains without access to electricity[1]. When statistics of access to clean and safe cooking fuels in SSA are considered, a more gloomy picture is painted with wide ranging negative implications on health, environment and gender equality. Furthermore, limited inflow of the much needed international finance required to facilitate investment in clean energy infrastructure makes the transition even more challenging.

Limited research, incorrect scoping of the energy situation, and hazy definitions of what electrification should include, have stymied the financial flows required for energy infrastructure investment in SSA. For instance, an investment profile that focuses on using stand-alone solar systems for rural communities would be significantly different from that which focuses on providing electricity that can be used for a myriad of household needs, including cooking and heating.

To improve the estimation of capital requirements for a sustained energy transition, researchers and policy analysts rely on models to support their policy advice. Models provide a rich and consistent representation of energy technologies and are used to estimate how much would be needed to cost effectively meet energy needs. In addition, models are useful for highlighting the technologies that would be optimal to invest in and the corresponding human resources that would be needed, among other issues. However, for many countries in SSA, the energy sector is faced with various developmental challenges which are not

comprehensively captured in these techno-economic models. Among these challenges is the high usage of non-commercialised biomass fuels.

Important to energy transitions as models are, they do not comprehensively capture qualitative aspects of the energy sector and other development issues that are required to inform the design and development of a sustainable energy system. As Baker et al.[2] argue, a sustained and just energy transition in SSA can only be achieved when particular regional or country specific issues (both quantitative and qualitative) are captured[3,4,5]. Thus, one of the key steps in capturing specific issues is by including local stakeholders' views in the development process of the transition plans.

More often than not, however, programme design targeted at enhancing energy transition in SSA tends to gloss over the region's specific needs and intra-regional differences. Such an approach leads to limited programme success. Nonetheless, incorporating qualitative insights and issues into models presents significant challenges. This is a challenge that Baker et al.[2] address in their recent publication in *Energy Research & Social Science*.

Highlighting how models have been used in energy planning in developing countries, these authors aim to complement quantitative techno-economic analysis by eliciting stakeholder preferences related to energy solutions at local and national scales. Using a case study of Ghana, the authors use a qualitative methodology to examine stakeholder preferences. They draw on value-focused approaches to develop a Strategic Objective Hierarchy, a visual method used to structure energy objectives. The authors then propose to use this to inform decision-making on electricity systems, and to highlight where values and preferences have been omitted from modelling efforts. They argue that this method provides a way forward in terms of translating qualitative insights about values into techno-economic models.

Baker et al.[2] bring to the fore the energy access challenges that many SSA countries face. On the one hand, many Governments must ensure access to energy for all to stimulate sustainable economic and social development, while on the other they must tackle power crises. Ghana is faced with these and other challenges; for example, the electricity sector is dominated by thermal generation, which accounts for 61%[6], although plans are underway to utilise domestic renewable energy sources including solar, wind and modern biomass. Ghana also presents a relative success story in SSA with respect to electrification and has reached 90% access in urban and 65% in rural areas. It is also fairly typical since 78% of the population remains dependent on traditional biomass for cooking and heating[7].

The authors show how stakeholder engagement is critical to inform targeted and appropriate interventions in the electricity planning and policy process, particularly in the case of SSA. They illustrate, for example, the difference between government developmental objectives and those of the population on the usage of electricity. Understanding these divergent needs will be key to inform electricity planning. Stakeholder engagement is also vital for the development of sustainable energy systems that work for all by inculcating a sense of ownership and allowing for greater inclusion in decision making. Enhanced engagement could be used to garner discussion around the attainment of the SDGs and to bridge the gap between local and global objectives. To do this, Baker et al. argue that stakeholder engagement will need to take place at all levels of the design process. This is important to

ensure a coordinated approach and address the differing objectives of stakeholders at local, national and international levels.

Baker et al. provide a compelling case for the need to incorporate qualitative understandings of preferences and values into quantitative energy system models. Their research reveals that while environmental objectives are an important global driver of energy system change, this is not reflected at the local level where environmental concerns are subsidiary to the provision of affordable and reliable electricity. This means that policies to promote the use of renewable energies should pay close attention to issues of social justice[4]. In doing so, it is hoped that electrification efforts also deliver on the wider development agenda, including contributions to health, education and local economic development[8]. The research also reveals stakeholder preferences for the development of business models that promote productive uses of energy, as well as an emphasis placed on minimising the trade-offs between the cost of electricity, the reliability of the system and the provision of electricity access to all.

However, while the stated aim of the paper is 'to complement and *inform* the energy models used to analyse and optimise the operations and planning of country-level electricity systems' (p.3, emphasis added), it does not deliver on this aim. In particular, beyond highlighting the undoubted importance of eliciting stakeholder preferences and values it does not offer ways in which these might be integrated into energy models. This is a crucial but missing step and one which bedevils research in this (and many other) field(s). More reflection from the authors on how this next step in translating qualitative findings, such as those presented here, into quantitative tools used in decision making would have been welcome.

Further, while value-focused approaches, such as that proposed by Baker et al., will enhance and enrich the electricity planning and policy process, significant gaps are likely to remain on how different stakeholders define issues. For example, while electrification in Zambia is considered a strategic way to provide access to clean cooking fuels, in countries with alternative clean cooking fuels, such as LPG, electrification is viewed as a means of improving lighting services and other lighter electrical loads.

Worldwide, transitions to cleaner and more just energy transitions are urgently required. In SSA such transitions must also entail the delivery of clean and affordable modern energy services to more than 500 million people who currently lack access. As cogently argued by Baker et al., increasing inclusivity in electricity planning and policy processes, including in techno-economic energy models, will be an important step forward in ensuring that multiple development objectives are achieved so that no-one is left behind.

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