



Original research article

The uptake and diffusion of solar power in Africa: Socio-cultural and political insights on a rapidly emerging socio-technical transition

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ARTICLE INFO

Keywords:

Sustainable energy access
Solar PV
Socio-cultural
Political

ABSTRACT

This special issue focusses on the now rapidly growing solar photovoltaics markets across various geographies and scales in Africa. Herein we summarise the contributions of the component papers and position them within the context of the sustainable energy access literature. We argue that there is an urgent need for greater attention to the neglected socio-cultural and political dimensions of sustainable energy access, dimensions that are vital to understand if ambitious global commitments to sustainable energy for all by 2030 are to be achieved. Included in this special issue are papers on the systemic and socio-technical nature of energy access transitions; their politics and political economy; gendered dimensions; critiques of their technologically determinist framing and the implications for marginalising local actors; and, perhaps for the first time in the energy access literature, application of social practice perspectives to the energy access challenge. The result is a diverse range of empirically-grounded, theoretically and methodologically novel approaches, providing new insights into and understandings of the neglected socio-cultural and political dimensions of sustainable energy access.

1. Introduction

1.1 billion people lack access to electricity [1] – a vital pre-cursor of multiple aspects of human development and economic growth [2]. In Africa, this issue is more acute than on any other continent, with only around 43% of those in sub-Saharan Africa (SSA) able to access electricity [1]. Despite a global policy consensus, however, we are not on target to meet international commitments to provide “sustainable energy for all” (SE4All) by 2030 [3], a fact confirmed during a review of progress towards SDG7 by the UN High-Level Political Forum in 2018. There is therefore an urgent need for new thinking on how global efforts can be accelerated, and how they can operate with other initiatives to promote socially-just sustainable energy provision.

We would argue that a fundamental part of these efforts includes the need to re-examine the ways in which transitions towards sustainable energy provision can be achieved; and that this requires a reframing of the ways in which the challenges are understood and acted upon. As the introduction to a previous special issue (SI) in this journal observed [4], energy provision is a field dominated by the disciplines of engineering and economics, and is thus preoccupied with the financial and technical dimensions of the challenge. The door is wide open, therefore, for critical social science voices to join the debate. Doing so may help us avoid

the traps of technological determinism implicit in much engineering and economics based analyses. In particular, there is a need to attend to the neglected socio-cultural and political dimensions of sustainable energy provision.

The aforementioned SI – “Renewable Energy in Sub-Saharan Africa: Contributions from the Social Sciences” (Vol. 5) – covered a range of energy issues and technologies, setting out a broad agenda for social scientists conducting research on renewable energy in Africa [4]. It made an important contribution across multiple areas; a contribution that, in this SI, we seek to build upon and extend in two ways. First, the current SI focusses predominantly on photovoltaics (solar PV) in Africa as opposed to renewable energy in general. This is warranted by the astonishing pace and scale at which solar PV is diffusing across the African continent, together with a plethora of new business models and an increasing emphasis (especially by donors) on the private sector and “entrepreneurs” as key actors for driving this change [5–7]. A core aim of this SI is therefore to explore, from critical social science perspectives, the dimensions and driving forces of this particular “socio-technical transition”.

Second, and perhaps more critically, we seek to draw a marker in the sand of social science research on sustainable energy in Africa and beyond. In particular, we emphasise, and demonstrate the value of,

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work that focusses on the socio-cultural and political dimensions of energy access. This does not mean we neglect technology or finance; these dimensions are addressed in all the contributions. The perspectives showcased here, however, position technology and finance within broader socio-cultural and political realities that, as the papers demonstrate, often fundamentally determine the success of energy access initiatives. Some papers focus directly on the social or political; in many, these considerations are operationalized via more sophisticated understandings of innovation and broader processes of socio-technical change.

Furthermore, a focus on the socio-cultural and political dynamics of energy access connects this SI's contributions with critical social science scholarship on sustainability more broadly. This includes contemporary engagement with ideas of “sustainability transformations” [8] and socially-just sustainable development [9], as well as the push-back against managerialist concepts such as the “nexus” (e.g. between energy, water, food, climate, etc.) [10]. It also intersects with critical accounts of financialisation and accumulation in the context of sustainability transformations [e.g. 11,12], and the increasing neoliberalisation of development policy and practice [13]. Each of the 12 papers in this SI develops empirically-grounded analysis and argument, providing important insights in their own right. But, together, they constitute a diverse collection of voices, cases, conceptual tools and methodological techniques. We hope this plurality of perspectives, alongside other critical social science work now emerging in the field (reviewed further below), opens up energy-access debates by stimulating new thinking and new directions in research, policy and practice.

In the next section, after discussing the relevance of focussing on solar PV in Africa, we position this SI within the emerging social science literature on sustainable energy access. In Section 3, we discuss some methodological aspects of the SI, including noteworthy methodological innovations in regard to the energy access literature, the geographical coverage of the SI's papers, and reflections on the process of convening the special issue. We then summarise the contributions made by the papers before ending with some conclusions, including the SI's relevance to policy and practice.

2. Solar PV, Africa and the socio-cultural turn in energy research

Across Africa, market forces are working to complement or replace the role of state and donor agencies in supporting solar PV, previously considered a “niche” technology [14–16]. Investment is occurring at multiple scales, from pico-solar products and solar home systems (SHSs), to mini-grids, village-based charging stations and large-scale multi-megawatt on-grid PV installations [6]. These trends are, however, manifesting unevenly across political and economic boundaries. While several authors point to the central importance of understanding the political and socio-cultural dimensions to the technological transition taking place across developing countries, few authors have explored these aspects in empirical depth. Indeed, as we noted above, the wider topic of sustainable energy has been predominantly analysed from the perspectives of technological change/innovations and economic feasibility studies, within a field dominated by the disciplines of economics and engineering. This two-dimensional “technology-finance” perspective has resulted in a “scholarly deficit” [15] in research on solar PV, and sustainable energy in developing countries more broadly, despite the increasingly high-profile international policy attention to the sustainable energy agenda (e.g. the UN's SE4All commitment and the Sustainable Development Goal, SDG7). Equally, it is useful to reflect on the relationship between cultural, political and social transitions themselves, and how these, in turn, shape, steer and drive market forces and the transition to solar PV technology.

Some recent work on sustainable energy has witnessed the beginnings of a “socio-cultural turn” [15]. A small number of contributions, including a handful from the previous ERSS SI on renewable energy in Africa, operationalize theoretical insights from social anthropology

[17–22], socio-technical transitions [16,23–32], and common-pool resource management perspectives [33], and there is a growing literature on the gender dimensions of energy and development [e.g. 34–36]. Work on the political aspects, however, is almost non-existent, save for a handful of contributions dealing with energy, climate change and development more broadly [37–42, but see 43].

A gap thus exists in understanding the political and socio-cultural dimensions to this rapidly unfolding transition. Detailed analyses can provide insights into the importance and implications of these neglected dimensions in the process of creating or facilitating markets for small-scale PV; in adopting certain policy instruments; in initiating, designing, negotiating and constructing large-scale PV projects; and, crucially, in seeking to understand the extent to which poor and marginalised women and men will gain or lose from these different pathways [c.f. 9] to electrification. As such, this SI seeks to explore some of the fundamental development implications of new markets and technology diffusion: e.g. capacity strengthening and the industrial spill-over effects of the transition to solar PV; or the ways in which the increased emphasis on neoliberal market-based interventions and entrepreneurialism privileges the interests of some actors over others, with material implications for the poor and marginalised. Such analysis is also important as the transition to sustainable energy access is highly uneven across different countries and varies sharply within countries, across urban and rural contexts, and between high and low-income communities [44,45].

3. Methodologies

In this section, we point to three noteworthy methodological innovations presented in this SI before discussing the geographical coverage of the papers. We then describe and reflect upon the process for selecting the SI's papers, including a few thoughts on what could explain the under-representation of African authorship in the final selection.

3.1. Methodological innovations in this special issue

Similar to this journal's earlier SI on renewable energy in Africa, the papers here operationalize mostly qualitative research techniques, often with a focus on in-depth case studies. Three observations are, however, particularly noteworthy. The first is the emergence of the application of ethnographic research methods, adding to a small number of “energy ethnographies” such as those in another recent ERSS SI on energy and ethics [46], on sustainable energy access in India [47], and the energy metabolism of a Gambian village [48]. The ethnographies presented in several of the papers in this current SI give prominence to social constructions of the everyday lived realities of the poor and marginalised; those “passive” actors who are often uncritically assumed to benefit from the interventions and policies debated by energy and development analysts and academics. Perhaps unsurprisingly, as will become clear below, this ethnographic focus is coupled with the application of more critical theoretical perspectives, such as social practice theory, and those from the field of science and technology studies (STS).

A second methodologically noteworthy point is the appearance, possibly for the first time, of a journal paper that uses data obtained remotely through mobile-enabled payment and provision systems (Bisaga and Parikh). We are aware that many of the companies active in the rapidly-unfolding space of pay-as-you-go (PAYG) business models around solar PV [see e.g. 16,81,82] have access to such data. This opens up multiple opportunities for what may be particularly sophisticated analyses of the ways in which people pay for and use electricity.

A final methodological observation refers to the application of action research techniques. These are mostly by the same authors who, based on similar action research, contributed to the earlier SI in this journal on renewable energy in Africa. In particular, Ulsrud et al., and Winther et al., operationalize such an approach, demonstrating ways in

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