



Original research article

Clean energy product markets in sub-Saharan Africa: Complex market devices and power asymmetries

Gillian Davies*



Centre of African Studies (CAS), School of Social and Political Science, University of Edinburgh, Chrystal Macmillan Building, 15a George Square, Edinburgh, EH8 9LD, UK

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ABSTRACT

Low levels of access to modern energy services in sub-Saharan Africa combined with increasing awareness of climate change have made domestic-scale sustainable energy products, such as solar lanterns and improved efficiency cookstoves, popular within international development programmes. Following the turn towards private sector approaches to deliver basic services in the global South, many organisations of different types are trying to establish market infrastructure for these energy products to reach the ‘consumers’ they are designed for. This paper examines certain socio-technical arrangements within these market systems and identifies areas where they can inadvertently reinforce inequalities along the value chain, even if consumers are finally reached. Responding to Çalişkan and Callon’s call for more research into marketisation processes and drawing on the concept of ‘market devices’, the paper identifies three market devices as case studies: warranties, carbon credit frameworks and product standardisation tools with related certification schemes. Discussion of these devices is informed by ethnographic research in Kenya, Uganda and Malawi.

1. Introduction

The years leading up to the current decade of ‘Sustainable Energy for All’ saw a rapid escalation of international efforts to provide access to modern energy services, with a Sustainable Development Goal (SDG) now dedicated to creating universal energy access. Numerous types of small solar products designed specifically around the needs of the poor have emerged. From 2011–2015, the known number of ‘pico-solar’ lighting products sold in sub-Saharan Africa grew from less than half a million to over 11 million, with unbranded products possibly doubling that figure [1]. Cookstoves have already had a long history within international development, with local potters since the 1980s being trained to produce stoves that provide increased fuel efficiency and reduced smoke emission compared to open ‘three-stone’ fires. These programmes are now being extended further and compete with hi-tech goods designed and tested in dedicated western laboratories. The proliferation has been driven by a combination of factors. The international development community, climate finance stakeholders, international and local businesses, and prospective end-users all engage with sustainable energy technologies for different reasons, making them multifaceted. As long as energy products are valued by different people or groups of people, they are open to market exchange.

How the markets around these products evolve has surprisingly had

limited scrutiny, however. Going beyond a simplistic dichotomy of those with resources supplying and those in need buying, the nuanced character of an evolving market infrastructure can show very different levels of inclusiveness. Application of Çalişkan and Callon’s [2] conceptual framework for markets as socio-technical assemblages helps identify that ‘market devices’ [3] can end up exacerbating inequalities between rich and poor. Complex mechanisms such as warranties, carbon credit frameworks and product standards are intended to protect or better serve the target market, yet their complexity can leave those in the target countries on the market peripheries, unable to gain value beyond the opportunity to be consumers.

This paper draws on examples from initial ethnographic research in 2011 and 2012 in Kenya, Uganda and Malawi, primarily participant observation of two British organisations (one charity and one social enterprise) working in the development of household-level solar and bioenergy product markets. A further 40 organisations were engaged with through interviews, and longitudinal observation of energy markets was continued through field research in 2014, 2015 and 2016, mainly in Malawi. The organisations and actors engaged with over time have included product designers and manufacturers, those developing profit and non-profit distribution channels in country, government agencies, carbon finance project developers and products standards organisations.

* Present address: Bristol BioEnergy Centre (BBiC), Bristol Robotics Laboratory (BRL), University of the West of England (UWE), Frenchay Campus, Bristol, BS16 1QY, UK.
E-mail address: gill.davies@uwe.ac.uk.

2. Context: energy access for development

Given the strength of discourse and momentum around the energy poverty problem, the wealth of emerging ‘pro-poor’ and ‘sustainable’ energy products such as solar lanterns and improved efficiency cookstoves are often conceptualised as ‘humanitarian goods’ [4] or ‘life technologies’ [5]. Products aimed at meeting the needs of the ‘energy poor’ are also now situated within a landscape of increasing application of private sector approaches for achieving development aims. Advocated by Prahalad [6] and others, the turn towards market-based methods is based on the premise that stimulating domestic economic activity is conducive to development, whether it be through the poor as producers, distributors, consumers, or a combination of those roles within any given value chain. Organisations advertising a pro-development agenda have similarly broadened in their various guises – from traditional non-profit charities to specifically established ‘social enterprises’ or even mainstream multinationals (e.g. [7–9]).

This diversity is reflected in the emerging array of organisations trying to set up energy product supply chains in sub-Saharan African countries, predominantly targeted at off-grid rural consumers. Early efforts were often focussed on supporting the growth of small enterprises, an approach that has a long history within international development. More recently, the emergence of solar lanterns typifies a new wave of high-technology being specifically adapted to try and meet needs in developing countries. Basic solar lanterns are single light units with an integrated battery and either an integrated or detachable small solar panel (typically 0.5–5 W) and often with phone charging capacity. Larger units start to have more bulbs and a wider range of applications, such as being able to power a radio. Bringing the designs to those they are intended for are an increasing number of charities and companies variously involved in the design, mass manufacturing (predominantly in China), import and distribution of pico-solar products. Solar markets are often highly fragmented and vary significantly across sub-Saharan African countries according to local context and market maturity, amongst other factors. International suppliers and distributors can range from multinational companies introducing a new product line to specifically solar-focused, smaller international organisations. Local operators similarly vary in scale and degrees of formality. The majority of solar lantern producers and distributors engaged with during this research were small to medium sized international organisations, most being characterised as social enterprises.¹ They were found to be the most prevalent and active organisations on the ground in the three countries of research, with a particular focus on the Malawian solar market.

Social enterprises are similarly playing an increased role in a more commercially-focused cookstove sector. New international organisations² are designing and distributing highly engineered cookstoves that have the same basic components as the models that local potters have been trained to make since the 1980s [10], yet are visibly distinct due to their advanced design and mass manufacturing origins. The cutting edge designs provide greater fuel savings for the user, reduced smoke production and increased durability. The final products inevitably have a higher cost than more traditional stoves, but that does not always end up reflected in the consumer price and can create a tension where local stove production is already established. The two main types of cookstove producers engaged with during this research were again based on which market participants were found to be most active on the ground in the focus countries, particularly Kenya and Uganda. They therefore reflect the dichotomy outlined above: firstly, local individuals or small co-operatives of limited formality, producing stoves using traditional methods and often supported by international non-profit organisations,

and secondly; small to medium sized international organisations producing hi-tech imported stoves and being the more recent market entrants.

3. Conceptual framework: the socio-technical nature of markets

Many early academic studies into renewable energy-oriented development interventions present case studies to demonstrate that the technologies applied are effective rural electrification solutions (e.g. [11,12]) or analyse the barriers to their take-up (e.g. [13,14]). More recent literature has provided some analysis of the challenges and advantages of using market-based approaches to provide access to these technologies (e.g. [15–18]).

This paper, by contrast, is underpinned by the premise that a growing emergence of commercial market-based approaches requires a similarly market-focused conceptual framework in order to reveal the dynamics of new actors and relationships in the energy access space. Detailed analysis of the specific processes occurring to actually create the market infrastructure for these products is required, in line with Çalişkan and Callon’s [2] compelling argument for greater study of ‘marketisation’. They apply the marketisation term to “...the entirety of efforts aimed at describing, analysing and making intelligible the shape, constitution and dynamics of a market socio-technical arrangement” [2, p. 3].

Callon et al. [3] identified that the actual tools and systems that allow markets to function (i.e. products and services to circulate) are often overlooked in social science studies. They term “the material and discursive assemblages that intervene in the construction of markets” [3, p. 2] as ‘market devices,’ similar to Foucault’s ‘dispositifs’ (often translated as ‘apparatus’) but with physical artefacts and tools incorporated. Market devices help shape the ways in which people and products interact in a market, for example shaping the processes of qualification³ and price setting.

In its journey from being an object of undefined value to becoming a product circulated in a market, there are numerous ways in which a sustainable energy product, like any other commodity, is stabilised in terms of its physical form, its conceptualisation and its associated value. These qualification processes often involve numerous market devices, from standardisation and quality frameworks that lead to consistent products and quality assurance labels, to packaging and marketing materials, to contracts for the longevity or replacement of the product through warranty schemes. Successful application of market devices can help increase the perceived value of a product for sellers and buyers. Callon et al. [3] cite examples of market devices “from analytical tools to pricing models, from purchase settings to merchandising tools, from trading protocols to aggregate indicators” [3, p. 2].

In order to understand the link between market devices and power asymmetries, exploring the complexity of tools applied in markets reveals how market systems are defined and dominated by expert discourse. As described by Foucault, expert discourse has a key role in maintaining power and control of societal institutions. Foucault focused on physical institutions such as prisons and mental health facilities; for example, he showed [19] that the expert medicalised discourse which now shapes madness is perpetuated by a network of healthcare professionals and their associated institutions, and can only be countered with competing expert discourses. This gives experts in the field power to shape attitudes more widely and restrict other ways of thinking as a form of control. Similarly, the emergence and application of expert discourses in the design and operation of market systems gives control to those who shape and enact those discourses, leading to the perpetuation of power asymmetries.

Callon and Latour [20] use the term ‘black box’ to describe how

¹ For example: D.light design, Nokero, Greenlight Planet, Barefoot Power, BBOX and SunnyMoney.

² Such as Envirofit and Burn Design Lab.

³ Qualification: whereby the list of qualities attached to goods are repeatedly “attributed, stabilised, objectified and arranged” [39, p. 199].

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