

Key messages

1. Successful transformations in poor people's access to sustainable energy technologies begin by trying to understand the lived realities of poor women and men in consuming energy services (like lighting or cooking).
2. Most interventions to date, however, only focus on two dimensions: provision of finance and technological hardware. Two-dimensional interventions usually fail.
3. Successful interventions foreground the *social* and *political* dimensions of innovation and technological change. They then use these to inform technological and financial innovation.
4. Successful interventions also build and strengthen *innovation systems* around clean technologies in low-income countries. Innovation systems consist of the network of actors that provide the context within which all innovation and technological change occurs (e.g. firms, universities, research institutes, government departments, NGOs, technology users, including poor and marginalized women and men).

Introduction

The international community has signed up to ambitious goals to tackle the dual problems of energy access and climate change. The UN's Sustainable Energy for All aims to achieve universal energy for all by 2030 (Sustainable Development Goal 7). This requires access to sustainable electricity for around 1 billion people that currently lack it and access to clean cooking technologies for 2.7 billion people – and all within the next 10 years. This demands nothing short of a transformation. But global efforts will fail unless the international community adopts a new understanding of innovation and technological change, grounded in the context of low-income countries and the lived realities of poor and marginalised women and men.

This policy brief sets out this new understanding. Many current approaches are only based on two dimensions of innovation: technology hardware and financing. This 2D understanding will not achieve sustainable energy for all.

To transform poor people's access to sustainable energy technologies, we must foreground the *social* and *political* dimensions of innovation and technological change. Interventions must also build and strengthen the *innovation systems* that provide the context for large scale, sustained processes of technological change and development.

This briefing takes Lighting Africa's work in Kenya and the emerging approach of the £39.8m UK Aid funded Modern Energy Cooking Services (MECS) programme as examples of best practice.

The problem with 2D hardware financing interventions

Interventions that aim to increase people’s access to clean technologies in the Global South have traditionally only acted on two dimensions of the problem, namely technological hardware and the finance to pay for this.

A typical example of “hardware financing” is the Clean Development Mechanism (CDM). Although supposedly neutral, the CDM greatly privileges countries such as China and India over those on the African continent (Fig. 1). Even accounting for the fact that China and India’s overall emissions are relatively high, the CDM still privileges them over African countries in investment per tonne of carbon emitted (Fig. 2).

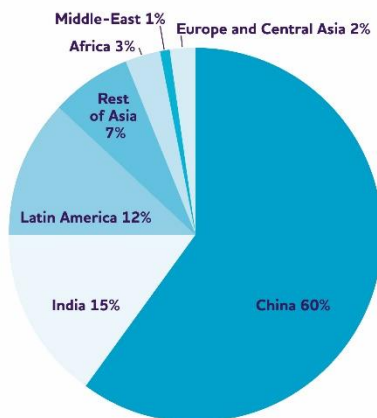


Fig. 1. Accumulated investment shares through the CDM Jan 2015, Source: Authors based on cdmpipeline.org

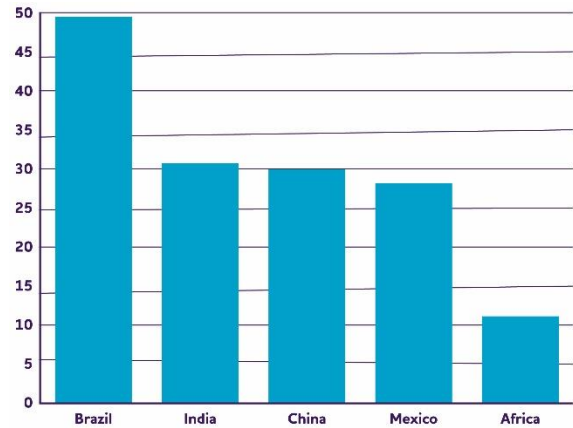


Fig.2 Accumulated investment through CDM USD per tonne of CO2 emitted (Jan 2015). Source: Authors based on cdmpipeline.org

These figures hardly suggest a transformation in poor people’s access to clean technologies. So why do two-dimensional, ‘hardware financing’ approaches tend to fail?

The social dimension of innovation and technological change

Hardware financing approaches like the CDM (and many other examples globally) fail because they do not recognise three other critical dimensions of innovation and technological change.

The first is the *social dimension*. Successful interventions that have transformed poor people’s access to clean technologies begin with a focus on the social. This means starting by trying to understand the lived realities of poor people and their current consumption of energy services, like lighting and cooking; and using this as a basis for the

innovation in technologies and finance that would meet their needs.

The IFC-funded Lighting Africa programme in Kenya transformed the market for solar lanterns from 29,000 in 2009 to around 15 million today. Lighting Africa started with research in five countries on how poor women and men consumed and paid for light. This informed the development of technologies and payment systems, followed by prototyping and testing in households. Over time, this process produced standards and certification systems that have since been adopted globally.

The MECS programme follows a similar approach around clean cooking, using social data to inform prototype development and further testing and feedback. Cooking, however, is more culturally complex than lighting: it links to deeply embedded cultural traditions about food and methods of preparation. This makes testing prototypes in households more challenging and demands that MECS develop innovative ways of accessing this critical data.

The **political dimension** of innovation and technological change

The second additional dimension of transforming access to clean technologies is *political*. Politics and broader political economy dynamics can be fundamental to the success or failure of interventions. Unequal distribution for reasons of electoral politics or patronage

can happen at village, regional, national and even global levels, and cultural traditions around food can be linked to political affiliations.

Lighting Africa understood the importance of this, and conducted targeted advocacy work at multiple levels, from village to global, developing shared visions around the potential benefits of a new solar lantern market. MECS similarly pursues advocacy work and political economy analysis nationally and internationally.

The **innovation system dimension** of innovation and technological change

In low-income countries, innovation systems can be weak or non-existent. The third additional dimension of transformative change involves the crucial task of creating and strengthening linkages between, and capabilities of, key actors within a country's innovation system (e.g. key private, public and civil society actors associated with different aspects of clean cooking technologies, from development, to distribution to financing, and so on). Success stories from the OECD, Asian Tiger Economies and Kenya can be explained by processes of building and strengthening innovation systems. In all these cases, upfront public sector support provided the bedrock for private sector actors to later enter and grow the market for new technologies.

The Lighting Africa programme focused on building and strengthening relationships between all key actors along

the solar lighting supply chain, whilst training technicians and vendors, and putting in place market reviews, roadshows, availability of products and small loans, testing labs, standards, and conferences and seminars. MECS is using similar systemic interventions and capacity building planned along whole supply chains for specific clean cooking technologies in different countries.

Transformations for universal energy access: From 2D to 5D

These examples help to show that technology hardware and finance are only two dimensions of five that are critical to any future interventions likely to succeed in achieving sustainable energy for all. The other three are the social dimension, political/political economy dimension, and the innovation systems dimension.

Critically, examples of success are those that foreground the social and use this to inform subsequent innovations around technology or finance. Successful interventions have been underpinned by upfront public investment to build and strengthen innovation systems in around specific clean technologies in specific low-income countries. They also attended to and sought to influence the political realities of the different contexts for desired transformations in poor people's access to clean technologies.

Achieving sustainable energy for all by 2030 demands a transformation. But global efforts will fail unless the

international community adopts this new, five dimensional understanding of innovation and technological change, grounded in the contexts of low-income countries and the lived realities of poor and marginalised women and men.

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Additional resources and further reading

Ockwell, D., Byrne, R., Chengo, V., Onsongo, E., Fodio Todd, J. and Atela, J. (2019) *Transforming Access to Clean Technology: Learning from Lighting Africa*, STEPS Working Paper 110, Brighton: STEPS Centre – Open access
<https://opendocs.ids.ac.uk/opendocs/handle/123456789/14684>

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