

Institution: The University of Edinburgh
Unit of Assessment: Anthropology & Development Studies
Title of case study: 4: Improving the Effectiveness of Alternative Energy Systems in Sub-Saharan Africa and South Asia
<p>1. Summary of the impact</p> <p>Since 2007, Edinburgh researchers have played an important role in increasing the use of local, context-specific knowledge in the assessment of technological sustainability and efficiency in the bioenergy and solar sectors in East Africa and South Asia. This has taken the following forms:</p> <ul style="list-style-type: none"> • Supporting policy development through establishing multi-stakeholder bio-energy forums in Kenya, Tanzania and Sri Lanka. • Improving clean energy access to approximately 180,000 people in Kenya, India, Sri Lanka and Tanzania. • Informing practitioners through high-level advice to campaign groups and international organisations. • Taking leading roles in public debates about the political economy of energy innovation in the developing world.
<p>2. Underpinning research</p> <p>Limited access to sustainable energy has been identified as one of the major constraints to development and poverty alleviation in the global South over the coming years. Moreover, unsustainable sources of energy are rapidly exacerbating existing tensions between growth, climate change and poverty. Research in Edinburgh has produced context-specific ethnographic evidence about the limits and potential of sustainable energy technologies in East Africa and South Asia, focusing in particular on two of the most promising, yet problematic, energy sectors: bioenergy and solar energy.</p> <p>Bioenergy. Project Innovation Systems for Clean Energy Security (PISCES) is a four-country, five-partner research collaboration, funded with £4.61m from the UK's Department for International Development (DFID) (2007-2013). James Smith - at Edinburgh since 2003 and co-investigator on PISCES - and Shishuru Pradhan - research fellow in PISCES partner, MSSRF (MS Swaminathan Research Foundation), before gaining employment in the University of Edinburgh in 2012 - have focused on two streams within PISCES:</p> <ul style="list-style-type: none"> • Understanding Research Partnerships: para-ethnographic research on how institutions interact in resource-poor settings to generate relevant new knowledge and technologies; • Research Into Use: how best to operationalise activities to capture new knowledge and turn it into development outcomes <p>One of the main insights of this research has concerned the assessment of alternative energy systems. In particular, this work has highlighted the importance of using appropriate methodologies (such as participatory market mapping), developing detailed case studies of effective small-scale bioenergy projects, and supporting multi-stakeholder policy forums in East Africa. The combination of methods, evidence and networking are necessary in order to understand the complex contexts in which new technologies succeed or fail, the bases on which success or failure depend, and how best to incorporate evidence into appropriate institutional and national policy-making (Lyall et al, 2009; Pradhan and Ruysenar 2013; Smith 2010).</p> <p>Solar energy. Cross's work has brought similar ethnographic insights to bear on the effectiveness of affordable energy technologies, this time with a focus on solar energy. Research at Edinburgh has been supported by Cross's 3-year Early Career Fellowship from the Leverhulme Trust (2011-14), for which Smith acts as mentor, and small grants from the ESRC-EPSC Interdisciplinary</p>

Network on Energy, Equity and Vulnerability (2012). This research focuses on solar photovoltaic technology designed for and sold to people living without electricity across Asia and Africa. There have been two main insights produced through this research. First, it has highlighted the importance of the relationships between entrepreneurs, technologies, and poor consumers in creating new markets for low-cost solar powered lighting systems (Cross 2013). Second, it has highlighted the need for increased public scrutiny of labour and environmental issues in the global supply chains for low cost renewable energy technologies (Cross, 2013).

3. References to the research

Cross, J. 2013. 'The 100th Object: Solar Lighting Technology and Humanitarian Goods', *Journal of Material Culture* 18:4, DOI: [10.1177/1359183513498959](https://doi.org/10.1177/1359183513498959).

Lyll, C., Smith, J. and Pappaioannou, T. (eds) (2009) *Limits to Governance: The Challenge of Policy-making in the Life Sciences*. Ashgate, London, available from HEI.

Molony, T. and Smith, J. 2010. 'Biofuels, food security and Africa', *African Affairs*, 109(436), 489-498, DOI: [10.1093/afraf/adq019](https://doi.org/10.1093/afraf/adq019).

Pradhan, S. & Ruysenaar, S. 2013. 'Burning Desires: Untangling and Interpreting 'Pro-Poor' Biofuels Policies in India and South Africa', *Environment and Planning A* 45, DOI: [10.1068/a45482](https://doi.org/10.1068/a45482).

Smith, J. 2010. *Biofuels and the Globalization of Risk*. Zed Books, London, available via REF2.

4. Details of the impact

If the global community is to meet the UN Secretary General's goal of providing 'Sustainable Energy for All by 2030', then alternative sources of energy – whether from natural biomass, purpose-grown biofuels, or photovoltaic solar technologies – will be part of the solution. Smith, Cross and Pradhan are using the findings from individual and collaborative research projects to meet the challenge of future energy access in East Africa and South Asia. The researchers have provided policymakers in those countries with new information and approaches that they can apply to unlock the potential of bioenergy and solar power to improve energy access and livelihoods in poor communities. Impact has therefore come through *shaping and influencing policy made by government, quasi-government bodies, NGOs and private organisations, stimulating public debate*, and in facilitating *the direct provision of energy sources*.

Supporting Policy. Research findings have helped shape domestic and international policy making on bioenergy. The clearest evidence has been the central role of the PISCES project, at the invitation of the Kenyan and Tanzanian governments, in the establishment of multi-stakeholder policy working groups (for corroboration see 5.1). Building on research insights into the importance of multiple stakeholder input for the effectiveness of alternative energy policy (Smith 2010), PISCES led the creation of a bioenergy Policy Working Groups (PWG) in Kenya and Tanzania (2009-2012). In Kenya, for example, the PWG was chaired by the Permanent Secretary of the Ministry of Energy, with members from government, NGOs, bilateral donors and business. A similar process is underway in Sri Lanka, albeit at an earlier stage. PWGs seek to develop a consultative and participatory policy methodology to discuss and guide bioenergy policy. Members of the Kenya PWG established by PISCES were instrumental in the writing of the country's National Biofuel Policy, approved by the Ministry of Energy. Under the new Kenya constitution promulgated in 2011, the draft Kenya National Biofuel Policy was integrated into the draft Kenya Energy Policy 2013, which is currently awaiting approval by the new Parliament (5.1). PISCES involvement led to a policy formulation process that involved a diversity of stakeholders, in particular, civil society.

Improved clean energy access. The above policy interventions have had an impact on the use of alternative clean energy sources. Although precise measurement in Global South conditions is

very difficult, PISCES estimates that it has improved clean energy access and livelihoods via bioenergy for approximately 180,000 people in Kenya, India, Sri Lanka and Tanzania. It did so, for example, by bringing together stakeholders to facilitate the translation of basic science into marketable technologies in East Africa. As a direct result of these forums, training and market mapping, PISCES has facilitated the distribution and use of 30,000 efficient gassifier stoves. The figure of 180,000 people is based on the assumption that each stove serves a household of six people (see 5.3 for details).

In March 2013, in partnership with the Microloan Foundation, Cross and Smith were awarded £377,304 by the Scottish Government. The grant was a practical recognition of the importance of Cross's insights into the effective take up of solar energy amongst poor populations. A significant slice of the project focuses on supporting 'solar entrepreneurs' – women who sell photovoltaic panels to provide lighting, phone and battery charging to improve the lives and livelihoods of 15,000 female clients in Malawi (5.4).

Informing Practitioners. Research has directly informed professional debates and practices through expert contributions to practitioner-led networks on biofuels and solar photovoltaics. In 2011, as a result of the recognition of the importance of his work on science, technology and development, Smith was appointed as a technology and development specialist to the board of Practical Action, the leading INGO working on the role of technology for development and sustainable energy provision. Smith's role is to contribute to their notion of 'technological justice' as an advocacy tool, taking advantage of Smith's expertise in influencing debates around equitable access to technology and thus expanding their developmental reach. Meanwhile, in March 2013 Cross was appointed as a Technical Advisor to the Silicon Valley Toxics Coalition (SVTC), a leading INGO engaged in research and advocacy in the global solar industry. His key contribution has been to support SVTC's Solar Scorecard, an initiative that holds manufacturers and suppliers publically accountable by monitoring sustainability and social justice issues in their supply chains.

Research capacity-building programmes and training workshops have created additional practitioner impact. According to the Director of Research at the African Centre of Technology Studies Institute in Nairobi - the leading African think tank on science and development - this work has 'contributed significantly to the capacity building and training initiatives' of the centre (see 5.5). Smith has contributed to the training of 1349 bioenergy development stakeholders in the UK, East Africa and Sri Lanka (5.11). As part of this process, small-scale bioenergy projects supervised by Smith for the UN's Food and Agriculture Organization (FAO), for example, have led to an influential report which has provoked practitioner debates about the tensions between small-scale and large-scale bioenergy provision at the FAO (see 5.6).

Engaging Publics. Research has broadened public understandings of science and technology in international development. It has done so through challenging existing development practice, raising new questions about the political economy of technological innovation and global social entrepreneurship, and by holding business practices up to scrutiny. In the UK, Smith drafted a chapter on 'Ethical Principles and Biofuels Policy' for the Nuffield Council's 2010 report, *Biofuels: Ethical Issues*, which was the first public report to set out principles on which biofuel policy should be based (see 5.7). The reports recommendations have been strongly reflected in the 'Bioenergy principles' set out in the UK Government's Bioenergy Strategy, published in April 2012 (5.8). Further public engagement includes: invited commentaries on the emergence of biofuels in print, broadcast and online media (Smith), as well as at UK public festivals of science (Smith); the organization of a public debate on the ethics of market-based approaches to development at the University of Oxford in May 2011, bringing together panelists and participants from DFID, ODI, OXFAM, CARE, Unilever, and The Guardian (Cross); and the launch of a web-based portal aimed at bringing academic research to practitioners, <http://www.responsiblebop.com> which has registered an average 500 unique user hits per day since June 2011 (Cross) (5.9).

Smith and Cross's research has also had direct impact on public advocacy around biofuels and solar photovoltaics. Smith worked with Practical Action and ActionAid to help establish public

awareness of the political economy of biofuels before it was generally recognized that they might be socially, politically and environmentally problematic, and has fed into pressure on the EU to reduce biofuel blending targets (5.2). In 2011-12 Cross worked with the SVTC and the Dutch Centre for Research on Multinationals to establish Good Solar, an international network aimed at bringing together social, labour, and environmental activists to strengthen regulatory mechanisms in the global photovoltaic supply chain, which represents one of the first – if not the first – attempt to facilitate civil society networking, information exchange, capacity building and joint strategy-making at the level of solar supply chains (5.10).

5. Sources to corroborate the impact

PDFs of all web links are available at www.wiki.ed.ac.uk/display/REF2014REF3B/UoA+24

5.1 Letter from DfID, corroborating Smith's role in forming multi-stakeholder policy working groups, Kenya National Biofuel Policy and improving clean energy access. Provider is a reporter on the process of impact.

5.2 'EU Parliament vote on biofuels'. Nuffield Council on Bioethics Press Release, 11 July 2013. Corroborating impact of Nuffield Report on EU policy, <http://www.nuffieldbioethics.org/news/eu-parliament-vote-biofuels>

5.3 Spreadsheet of PISCES quantitative impacts based on PISCES partners' African Centre of Technology Studies, Kenya, Practical Action, MS Swaminathan Research Foundation, India, and the University of Dar es Salaam, Tanzania. Corroborating calculations on clean PISCES impact on clean energy take up. Available from www.wiki.ed.ac.uk/pages/editpage.action?pagelid=175640392

5.4 Microloan Foundation announcement on project. Corroborating Smith and Cross's involvement in project, http://www.microloanfoundation.org.uk/what-we-do/news/13-03-18/MicroLoan_wins_grant_from_Scottish_Government_s_Malawi_Development_Programme.aspx

5.5 Letter from the Director of Research at the African Centre of Technology Studies Institute in Nairobi, corroborating Smith's contribution to capacity building around energy and technology innovation. Provider is a participant in impact process.

5.6 Report published by FAO: Practical Action. *Small-Scale Bioenergy Initiatives: Brief description and preliminary lessons on livelihood impacts from case studies in Asia, Latin America and Africa*, <ftp://ftp.fao.org/docrep/fao/011/aj991e/aj991e.pdf>

5.7 Letter from Chair of Nuffield Biofuels Report, corroborating Smith's contribution to report.

5.8 'UK Government sets out 'bioenergy principles''. Nuffield Council on Bioethics, Press Release, 3 May 2012. Corroborating Nuffield Biofuels Report's impact on UK Government's Bioenergy Strategy, <http://www.nuffieldbioethics.org/news/uk-government-sets-out-%E2%80%98bioenergy-principles%E2%80%99>

5.9 Website Analytics, available from www.wiki.ed.ac.uk/pages/editpage.action?pagelid=175640392.

5.10 SOMO Annual Report 2012, http://somo.nl/publications-en/Publication_3949

5.11 PISCES report on Stakeholder participation. Corroborating PISCES involvement in training practitioners, available at www.wiki.ed.ac.uk/pages/editpage.action?pagelid=175640392.