Enabling Energy Access for the Poor

The need to strengthen the evidence base on decentralized energy access

Lucy Stevens, Practical Action

Achieving universal energy access by 2030 will require a change from 'business as usual' approaches in policies, financing, and implementation. Practical Action's Poor People's Energy Outlook series has focused on what energy access means for the poor, and what will be needed to address it. This briefing series builds on that work and aims to provide analysis and commentary on a wide range of energy debates from a poor person's perspective. This first edition launches the series by looking at gaps in the evidence base on decentralized energy access through a consultation and literature review. We discuss how this reflects the current shape of the sector as well as its implications for topics the series aims to cover.

PRACTICAL ACTION
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Executive summary

The current profile of energy access is unprecedented. 2014 marks the start of the UN Decade of Sustainable Energy for All, and the final Open Working Group outcome document (United Nations, 2014) includes a goal on 'affordable, reliable, sustainable and modern energy for all'. However, despite this global focus, the direction of policies, investments, and debate has not changed significantly in ways which will benefit the poor. More of the right sort of evidence can be part of changing the debate.

The demand for evidence was sometimes matched with supply, but there are clear gaps and neglected areas

Practical Action's *Poor People's Energy Outlook* series has, since 2010, been at the forefront of proposing new ways of understanding what energy access means for the poor, and what will be needed to address it. In this briefing series, we aim to provide more regular analysis and commentary on key debates in the energy sector, always bearing in mind the needs and realities of poor people.

In order to help shape the series, this paper presents a review of the current evidence base on energy access, and reports on a consultation with key practitioners and decision-makers in the sector. The aim was to establish where there are gaps in the evidence, and where there is the greatest need for more information.

The results demonstrate an appetite for greater evidence across a wide range of areas. In only one thematic area (energy resources) did more than 40 per cent of respondents say that 'good evidence' was available. For areas such as business models for energy providers, and costs and financing, over half the respondents said there was a need for 'much more evidence'. In terms of energy sources and scales the demand was greatest for evidence on solar and biomass/biogas, and for more information on mini-grids across all energy sources.

The demand for evidence was sometimes matched with supply, but there are clear gaps and neglected areas. There is a bias in the literature towards stand-alone appliances (cookstoves and solar lanterns) rather than mini-grids. There is plenty of literature on markets and the enabling environment, but greater gaps in evidence on business models and current access levels. Animal/human power and energy for productive uses or community services remain neglected areas.

Our findings reveal the biases and interests of the energy access sector. There is a great deal of interest in how private sector solutions can deliver (via successful business models), and clearly there needs to be a partnership between civil society, governments, and the private sector to deliver on universal energy access. However, whether these business models will deliver for the poorest 10 per cent, and for women as much as men, should be a greater part of the debate.

Through this briefing series, we hope to provide thought-provoking analysis and commentary, and challenge approaches and debates which are at odds with the needs and realities of poor people. We aim to develop these ideas in partnership with many different organizations and researchers, co-authoring and jointly producing papers. The series will be a vehicle to share new evidence and learning with the overarching aim of understanding how we can work towards universal energy access by 2030.

Why evidence is needed

There is unprecedented recognition that access to safe, affordable, and reliable modern energy services is both fundamental to poverty reduction and a critical enabler of development. This is good news for the 1.2 billion people without electricity and the 2.8 billion who rely on wood, charcoal or animal waste to cook their food (Banerjee et al., 2013). Energy supports people to improve their lives in many ways: from having cleaner, safer homes, to better livelihoods, health, and education. It can change the lives of women and girls and help generate local income when linked to productive activities. Securing universal access to modern, appropriate, and affordable forms of energy is now seen as playing an important role in the success of the broader international development agenda. There is every chance that an energy goal including the ambition to achieve universal energy access by 2030 will be included in the post-2015 development framework (United Nations, 2014). Since its launch in 2010, the UN's Sustainable Energy for All (SE4ALL) initiative has mobilized pledges from national governments, multilaterals, the private sector, and civil society actors to prioritize universal energy access by 2030.

Despite the global focus on energy access, policies, investments, and debate have not changed significantly to benefit the poor

However, despite the global focus on energy access, policies, investments, and debate have not changed significantly in ways which will benefit the poor. The discourse remains dominated by grid-based, large-scale infrastructure investments to boost power supplies, which will primarily benefit cities and industry. 'Business as usual' projections suggest that, by 2030, as many people will be living in energy poverty as today. Without a step-change, the number of people with no access to electricity will remain close to 1 billion in 2030; 2.6 billion people will cook using traditional fuels[i] (Banerjee et al., 2013: 114, 117) and 30 million lives will have been lost to indoor smoke-related diseases.

Some of the reasons for this inertia are related to structural factors: the remit of particular organizations, the systems governing how resources are allocated and spent. Some of it is also related to a set of uncertainties and misconceptions about how best to invest at the required scale in decentralized energy systems. More of the right sort of evidence can play a part in challenging these. For example, decentralized energy systems are often viewed as delivering second-rate, interim solutions which will not deliver the levels of energy access to which politicians aspire for their people. And yet experience shows that grid-based systems cannot, and do not, reach all people and that the quality of available energy is poor (unreliable and expensive). We also know that electricity is not the only type of energy that poor people need in order to achieve a basic level of energy services.

Building the evidence base from the perspective of poor people

In order to ensure that poor people's perspectives inform the debates, Practical Action launched the Poor People's Energy Outlook series in 2010 (Practical Action, 2014). The series has challenged the focus on energy supply alone, arguing that it is energy services which matter the most to poor people (lighting, heating, mechanical processing, powering ICTs, and more). It has challenged the narrow definition of energy access as being confined to energy connections or fuel type and proposed the concept of Total Energy Access to ensure that energy needs are considered across the spheres of households, productive activities, and community services. Poor people's lives are not

neatly compartmentalized and the resilience and sustainability of their livelihoods rely on, and would be greatly enhanced by, energy access across these spheres.

To encourage the delivery of this broad-based vision of energy access we have suggested the concept of a healthy 'energy access ecosystem' where the macro environment across policies, financing, and capacities works in harmony towards a common goal of expanding access to more and poorer people. We have also proposed new ways of measuring and defining energy access to encourage this shift.

Practical Action remains committed to continuing to produce the Poor People's Energy Outlook report. However, in this fast-moving and dynamic sector, there are many debates where further analysis and commentary from a poor person's perspective will add a new dimension.

This briefing series aims to fill this gap with shorter, more frequent papers. Its objectives are:

- to tackle issues which are pertinent to the current debate about energy access, sometimes focusing on particular national contexts, and sometimes taking a broader global view of an issue;
- to challenge 'business as usual' approaches to analysis or solutions in favour of approaches that promote poor people's needs;
- to provoke debate and interest in the energy access issues that matter to poor people and to hold institutions and policymakers accountable to their commitments to delivering energy access.

We aim to develop these ideas in partnership with many different organizations and researchers who share our desire to find ways of delivering the goal of universal energy access. Publications in the series will frequently be co-authored.

Evidence gaps in energy access

As a starting point for the series, Practical Action commissioned research to assess the existing evidence base on decentralized energy access for the poor. We looked both at the scope of material that exists and the perception of what evidence exists and where the gaps are from the perspective of practitioners and policymakers in the South and North. The purpose was to assess what kinds of evidence stakeholders are looking for, and how that relates to the information available to them. Building on this, the briefing series will help fill some of the gaps, but also challenge 'accepted wisdom' in the debate when viewed through from a poor person's perspective.

The research looked at supply and demand for different types of evidence

The research looked at the supply of and demand for different types of evidence concerning decentralized energy access for poor people, through a literature review and a consultation.[ii] The literature review covered 234 open-source materials produced since 2008.[iii] Materials from a sub-set of 12 publishers[iv] were reviewed in more detail because the stakeholder consultation had flagged these as regular 'go-to' providers of reliable information. The consultation surveyed 51 people (55 per cent from the South) and followed up with interviews with 21 of these. All were international or national-level energy experts who would have a view on the types and range of evidence available, but would not necessarily already be in favour of decentralized solutions to energy access. We aimed to cover a wide range of stakeholders including international agencies, governments, donors, academia, the private sector, and civil society.

Perceived and real evidence gaps: energy access themes

Energy access themes were identified and guided largely by the literature. Table 1 gives a more detailed explanation of what was included under each theme.

Table 1 Explanation of topics covered under each energy access theme

Energy access theme	Description
Markets and enabling environment	The national- and global-level policy and regulatory environment which should enable energy markets to flourish and to deliver energy access for all
Costs, economics, funding requirements	National- or global-level analysis to assess costs of achieving universal energy access, where investment or grant funding is required, and where current financial flows are directed
Energy provider business models	How particular enterprises can ensure a reliable cash flow to cover costs and grow to reach more people. This can include franchising/bundling of enterprises, as well as individual businesses
Access level, energy expenditure, demand, willingness to pay	The amount of different types of energy people have access to and use, affordability, and willingness to pay for different energy services. This information gives us an indication of the potential market for energy products
Socio-economic/environmental impacts	The impacts of different energy solutions/technologies, both positive and negative, and at a range of scales from community to national and global impacts
Technology performance	The kinds of energy services different energy solutions/technologies can deliver, reliability, and requirements in terms of operation and maintenance
Primary energy resources availability	Mapping the scale, location, and exploitability of energy resources such as wind, solar, and hydro

There was strong demand for evidence on business models, and costs and financing

The survey asked people about the evidence in different themes and whether 'much' or 'some' more was needed, or whether good evidence was already available. There was strong demand (over 50 per cent of the respondents saying 'much more evidence was needed') in the areas of business models for energy providers, and on costs and financing. Also receiving strong support (over 40 per cent of respondents) were themes around the potential market for energy products (existing levels of access and users' willingness to pay) and about the wider 'enabling environment' for energy access (Figure 1).

This all reflects the understanding in the energy sector that energy access will be delivered through market mechanisms, although with an important role for governments as policymakers and regulators. There is also some recognition that funding will need to come from sources other than users (whether from governments or aid). It is clear that practitioners and policymakers are still unsure about exactly how to structure and finance energy markets, and how to support and guide businesses to deliver energy access at scale.

There were few areas where a high proportion of people felt 'good evidence' was available. However, respondents felt reasonably comfortable with the level of information about the availability of energy resources, and partially about the technical performance of different

There were few areas where people felt 'good' evidence was available

energy solutions. It is possible that our sample was biased towards those dealing with policy rather than technical issues, and also that policymakers feel they understand the technical options available in terms of decentralized energy access. This perception might be part of the reason why it is so hard to shift from 'business as usual' approaches.

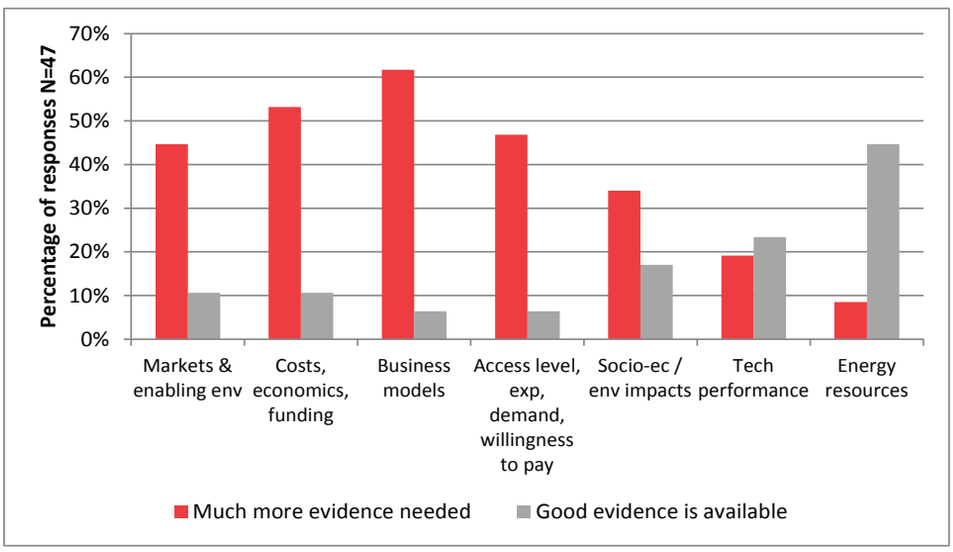

Figure 1 Survey responses about gaps in evidence for particular energy access themes

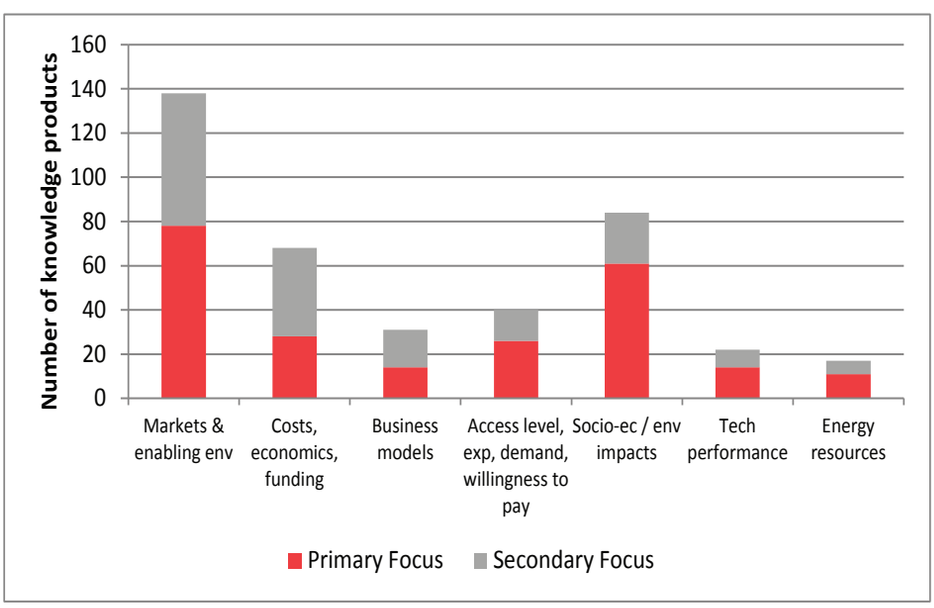

Figure 2 Existing literature focusing on particular energy access themes

We can compare the gaps in evidence identified by survey respondents with our analysis of coverage in the existing literature (Figure 2). The results are skewed in terms of the interests of the major publishers. For example, the World Bank and UNDP/UNEP together produced nearly half of the literature with a primary focus on markets and the enabling environment. Similarly, in terms of impacts, publications were dominated by UNDP/UNEP, with major contributions from GIZ and the World Bank.

Having said that, it is clear that although not great in number, the information about energy resources (produced e.g. by IRENA) or technical performance (GIZ, GACC, Lighting Africa) seems to be well respected with survey respondents feeling that 'good evidence is available' on these topics.

The areas where there are the biggest apparent gaps between supply and demand are in:

- business models for energy providers;
- access levels and potential demand; and
- (to some degree) costs, economics, and financing.

These are further illustrated in Figure 3.

The interviews with selected survey respondents shed more light on the issues people felt were important.

In relation to energy provider business models, interviewees talked about the need for greater understanding of:

- delivery at scale, with an interest in examples of how scale has been achieved, and the policies and financing, including subsidies, that helped support it;
- how to support access for the poorest 10 per cent, and the extent to which business models will be able to deliver for the poorest.

In the areas of the enabling environment and costs and financing, the areas of interest highlighted in interviews included:

- examples of regulatory frameworks and policies that support scaling up, and how to unblock institutional issues;
- how to address capacity and skills shortages at all levels including in academia and in research and development;
- tracking the allocation of resources for energy access to monitor whether decentralized energy access is receiving enough focus;
- understanding more about the cost and investment requirements to achieve universal energy access, with more detail on macro-economic issues at the national level in particular;
- how best to use public funds for energy access, including alignment with donor funding and the best use of subsidies;
- comparison of financing models, especially for entrepreneurs, such as results-based financing, fund of funds approaches, delivering credit through local banks, and how to build in technical assistance with financing.

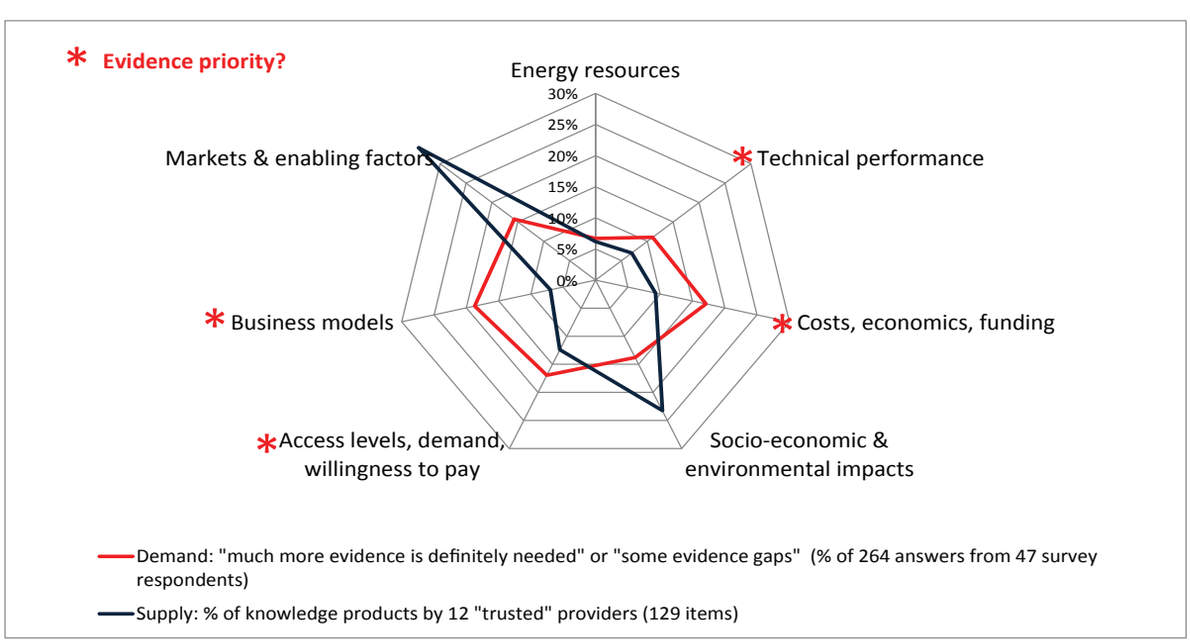

Figure 3 Comparing supply and demand for evidence on particular energy access themes

Around a third (34 per cent) of survey respondents said that much more evidence is needed about the impacts of energy access and on the different choices for how energy is delivered. There was debate in the interviews about exactly which areas might warrant further attention including:

- Understanding the levels of energy access required to be truly transformative in terms of development. What is the impact of going beyond basic access (a few light bulbs) to incorporating productive uses of energy? What is the economic benefit of different levels of access?
- A greater understanding of the gendered impacts of energy access, and applying this gendered analysis to comparisons of 'basic' energy and energy for productive uses.
- Evidence that could be used to encourage other sectors (such as health and education) to take energy access more seriously.
- More quantified evidence of impacts, for example, on health from clean cooking, based on independent longitudinal or population-based studies.

The question of access levels was conflated in the survey with issues of users' energy expenditure and willingness to pay. However, interviewees highlighted the need to monitor access levels and progress towards universal energy access. They wanted to find out more about country monitoring frameworks, lower-cost options for data collection, and evidence of whether new data would actually lead to changes in the way national policies or targets are set.

Perceived and real evidence gaps: energy sources and scales

As part of the consultation, survey respondents were asked to identify where they thought there were gaps in evidence for a list of different aspects of decentralized energy access for the poor. They could select different sources of energy (e.g. solar, wind, hydro) at different scales (stand-alone appliances, single household, and community).

There was interest in all sources, but there was more demand for information on solar, biomass/biogas, wind, and hydro compared with human/animal power or fossil fuels (such as LPG) (Figure 4). There was greatest demand for information about *mini-grids* across all energy sources (mentioned by 88 per cent of respondents) compared with home systems (77 per cent) and stand-alone appliances (72 per cent).

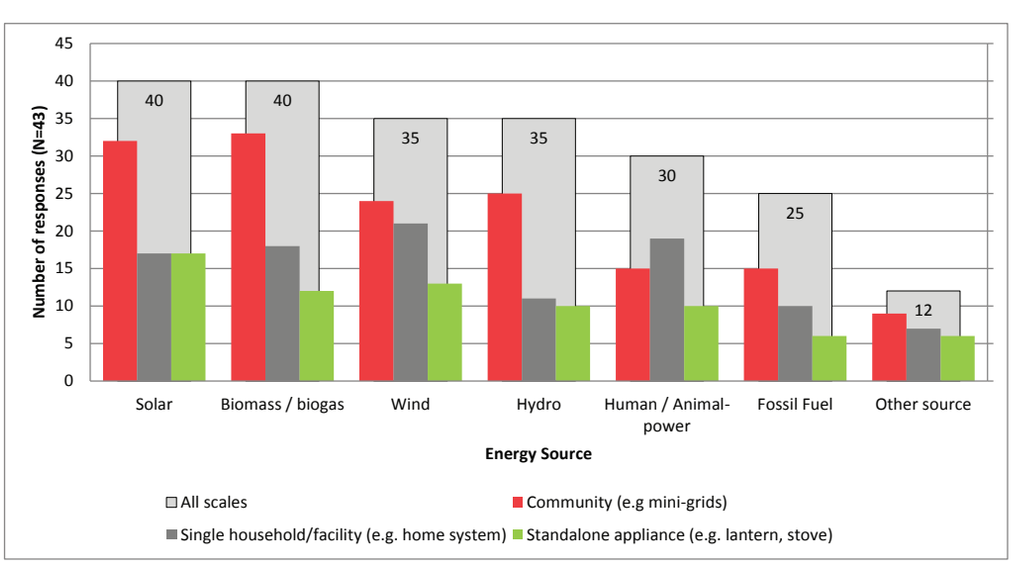

Figure 4 Survey responses about gaps in evidence about specific energy sources or scales

Within this, there was quite high demand for information about mini-grids in non-traditional areas such as in solar or biogas.

However, the sense from the interviews was that it is not particularly useful to focus on specific energy sources. People's questions are less about technical issues than about how any decentralized energy technology can be made to work in a given context. Although decentralized technologies are not trusted to deliver technically, there is less interest in publications that make the case for this.

Much of the literature does not refer to individual energy sources. Over 70 per cent of knowledge products reviewed covered more than one source, with many looking at overarching aspects such as 'energy markets'. However, we found the greatest number of knowledge products on specific sources focused on solar and biomass/biogas (Figure 5). The fact that there is already more literature on these areas, as well as a continuing demand for more evidence, perhaps reflects the shape of the industry. Many organizations do not specialize in a specific area, but those that do tend to be in the areas of cookstoves or solar lanterns.

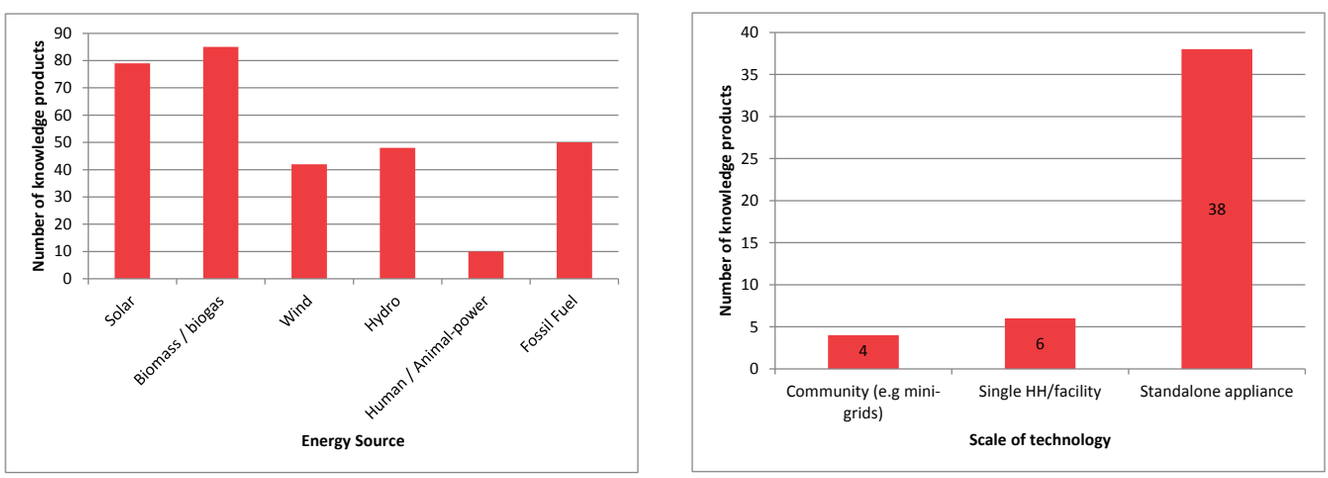

Figure 5 Existing literature focusing on specific energy sources or scales

Much of the literature did not focus on specific scales of technology, but among the resources that did, there is a clear *bias towards stand-alone appliances: specifically cookstoves and solar lanterns*. This does not match the far greater demand for community-level evidence around mini-grids.

It has long been acknowledged that the area of *energy for productive uses* is a neglected one. This is beginning to be addressed, but still the bias in the sector remains towards energy access at the household level. This was reflected in the literature search with few publications (28 per cent) distinguishing between household, productive, and community uses. Among those that did, only 6 per cent focused specifically on energy for productive uses. Similarly, very little of the literature discusses human or animal power. Energy for community uses also receives less attention with only 13 per cent of publications focusing on this area.

Conclusion and way forward

The results of the research demonstrate that there is a significant appetite for more evidence in a wide range of areas that are important for energy access. This is a growing and rapidly changing sector with new issues constantly emerging. There is much to learn, share, and reflect upon.

It is also apparent that, while single-technology focused reports are important, there is greater demand for information covering a range of technologies and thematic issues. There are a number of organizations which are already trusted sources of information about issues such as technical performance and technology choice in different areas, such as GIZ, GACC, and SNV. Our own Practical Answers technical enquires service also provides such information. In this area, the major gap appears to be in information about mini-grids across a range of energy sources.

Our findings are in part a reflection of the interests of the energy access sector. While we know there is a need for movement away from the 'business as usual' over-emphasis on grid-based solutions in the wider energy sector, there may be imbalances that need to be addressed in the energy access community as well.

We need to ask ourselves how far the interests of the sector (in terms of the demand for, and supply of evidence) are meeting the needs of poor people. We know that some of the greatest challenges for the sector lie in finding scalable solutions, especially for mini-grids, and that poor people have a great need for energy in productive uses (including for mechanical power) and community services – both of which are under-represented so far.

In terms of models and approaches, the results demonstrate frustration within the energy access sector about finding the best and most sustainable ways of delivering solutions at the scale required. We understand a great deal about markets and the enabling environment in general, but big questions remain about exactly how the skills and capacities of the private sector, civil society, and governments can be mobilized to bring about the changes we all want to see. Whether business models, or the enabling environment, will help deliver for the poorest 10 per cent, and for women as much as men, should be a greater part of the debate. We hope to be able to provide that challenge and perspective.

This new series will unpack and translate the findings from the research to inform the current and future debate. Thus, we plan to generate new insights into areas such as:

- How plans for energy access are being developed nationally and globally as part of SE4ALL and how much scope there is for poor people and their organizations to participate.
- Energy and productive uses, for example in the context of the nexus between water, energy, and food at decentralized levels.
- Understanding the impacts of different technology choices: there is a need to explore the implications (both positive and potentially negative) for poor people of low-carbon development pathways.
- Economics and financing, with topics including the role of carbon financing, and linked to that, how subsidies are being deployed, looking at their impacts on both energy access and local energy markets.

- Reporting on new data about energy access levels to inform policy and investment decision-making.

This energy briefing series will be a vehicle to share new evidence and learning. It aims to be thought-provoking and to challenge the business-as-usual approach to energy access debates. The series is a space for collaboration with energy access practitioners and policymakers. It seeks to inform how we can deliver on global, regional, and national energy access commitments, with one aim: to reach the universal energy access goal by 2030 and provide poor people with the energy services they demand, need, and have a right to.

Notes

i. These figures are from the Global Tracking Framework which draws on the World Energy Outlook 2012 projections for energy access by 2030 under the 'New Policies Scenario' (existing and announced policy commitments).
ii. The consultation took place in September and October 2013.
iii. These were limited to publications in English and excluded both articles in subscription-only scientific journals and grey literature such as blogs and news articles. We excluded materials focusing on topics outside the energy access debate such as commercial fuels production and distribution including commercial biofuels, energy for transport, and grid extension and densification.
iv. GACC, GIZ/EnDev/Energypedia, HEDON, IEA, IFC, World Bank, IRENA, Lighting Africa, REEEP, UNDP/UNEP, GEF, SE4ALL.

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Lucy Stevens is Senior Policy and Practice Adviser with Practical Action, UK. She leads the organisation's influencing and learning strategy on energy access.

This is part of a series of papers written to inform public debate on energy policy and development issues. We welcome your feedback and suggestions for collaboration. For more information, please get in touch at policy@practicalaction.org.uk

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Front page photo : Wind turbine: part of a small scale wind power scheme in Peru ©Practical Action, Ana Castañeda

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