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## BRIEFING PAPER 3

# NEEDS, WANTS AND VALUES: INTEGRATING GENDER WITH ENERGY ACCESS

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This paper builds on the collective body of knowledge of the ENERGIA network and the LCEDN.

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### Executive Summary:

This paper derives from a collaboration between the Low Carbon Energy for Development Network (LCEDN) and gender and energy specialists of the ENERGIA network which has been funded under the UK Department for International Development's Transforming Energy Access programme. This collaboration has brought together members of both networks in workshop discussions, shared dissemination events and knowledge sharing activities and the development of recommendations around the mainstreaming of gender within energy research programmes.

As one of the fruits of this collaboration, this paper focuses on the appropriateness of the recent tier-based energy access measurement methodologies now being deployed to track global progress. In particular, we focus upon the extent to which these types of methodologies are able to reflect how energy access impacts on gender equality and how gender norms and values impact on the benefits of access. Although these tools have a value in steering towards improving target setting and measuring progress, the paper argues that care should be taken in how the results are interpreted and used.

The paper outlines three main messages. These are:

- (i) that a focus on numbers of energy connections or availability of supply (or even quality of supply) although important, is insufficient in ensuring meaningful energy access for men and women alike, and in ensuring actual utilization of energy services because energy demands are gendered.
- (ii) that it is crucially important that we better understand the socio-cultural opportunities and barriers that motivate or hinder transitions towards the adoption of modern energy services
- (iii) that there is a need to develop approaches that will enable policy-makers to add depth to the energy access narrative and their interventions by addressing factors that contribute to a more inclusive development of energy access, particularly the empowerment of women through bottom-up innovation and more utilization of holistic (rather than energy sector centric) approaches.

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# INTRODUCTION

## Gendered Energy Poverty

Official figures show that, globally, the number of people without access to electricity fell from 1.7 billion in 2000 to below one billion in 2017 [1]. This is a welcome transition, given that the benefits of access to modern energy services affect all aspects of life and society, most notably improvements in health, wellbeing, and opportunities for income generation. The optimism inspired by this achievement, however, needs to be tempered by recognition of the inequality in access to energy services between geographic, economic and social groups, by recognition of the fact that energy services for cooking are lagging far behind, and that barriers of affordability, reliability and low quality of energy supply limit the materialisation of potential benefits. Aggregated data conceals the complex patterns of needs, wants and values that underly energy poverty, in particular that its causes, experiences and solutions are different for men and women, the reasons for which lie in social norms and values.

Within this context many households around the world are expected to continue to live in energy poverty<sup>1</sup> and amongst those considered 'connected', many more will experience problems with the quality and affordability of supply. It is likely that by 2030, in the absence of intensified targeted actions, 674 million people will still be without electricity by 2030, mainly in Sub-Saharan Africa and 2.3 billion people without access to clean cooking facilities in 2030 [3]. It is also likely that many of these energy-deprived households will never be connected to the grid, even if that were the most appropriate way to connect electrification to poverty alleviation.

As an extra layer of barriers to access, energy poverty has major gender implications – perhaps the most well-known of these is that the lack of success in the transition to clean cooking leads to a burden that falls mainly on women. Women not only suffer disproportionately from bad air quality from biomass cooking, but also from the time and drudgery involved in the collection of fuelwood, and the inhibiting impact of time scarcity on ability to engage in paid work. But inertia in the adoption of cleaner cooking is not the only gendered aspect of energy access and it may not be the most important one. Throughout the Global South, for instance, women find setting up a grid connection difficult because of property ownership requirements, access to bank accounts, lower incomes, possession of the relevant documentation and a host of other peripherally-discriminating features of gendered bias across different cultures. Furthermore, many typical forms of energy access do not cater for the energy demands involved in the types of activities and sectors in which women are highly engaged, such as process heat for small scale income generation in the food sector and mechanical energy to reduce drudgery of water collection, food processing and laundry.

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## Understanding gender to tackle energy transition inertia

Even if access to appropriate and affordable energy sources is in place, socio-cultural norms leading to inequality between men and women over the use of available potential services, inside and outside the household, mean that the benefits of energy access itself are gendered. Understanding of the inertia that limits transitions towards clean energy use, not only requires a deepening of insights into the various dimensions of energy poverty, but also of the factors that can address the causes of inertia. Gendered approaches to energy access are vital in serving to identify and develop opportunities to make the most use of the capacities of women – both in playing a key role in the energy value chain to supply energy services, and in sparking changes in society to harvest the potential benefits of energy supply.

In addition, understanding the inertia in energy transitions requires a recognition that societal, cultural, and political factors outside the control of households also determine access to energy. There is no linear process where a combination of availability of energy supply and an increase in income levels, results in a transition from lower quality energy supply (fuel wood, dung or kerosene) through intermediary appliances and fuels, finally to clean electricity. Instead, users often make the transition in stages depending on circumstances. Especially in low-income countries, a complete transition from traditional to modern clean energy services is rare; even when access is (physically) available, defensive patterns of energy use, such as fuel stacking, determine how and to what extent that transition takes place.

<sup>1</sup> Recognising the continuing debate on definitions, this paper uses the definition of energy poverty set out by Day et al [2] as being most relevant to energy and gender: “an inability to realise essential capabilities as a direct or indirect result of insufficient access to affordable, reliable and safe energy services, and taking into account available reasonable alternative means of realising these capabilities.”

In reflecting on the issues discussed above, this paper contributes to the discussion about the recent tier-based energy access measurement methodologies now being deployed to track global progress. In particular we focus on the extent to which these types of methodologies are able to reflect how access impacts on gender equality and how gender norms and values impact on the benefits of access. Although these tools have a value in steering towards improving target setting and measuring progress, the analysis presented below will suggest that care should be taken in how the results are interpreted and used. The paper also emphasises the need for more qualitative and quantitative sex-disaggregated data to tease out patterns of energy use, to highlight inequalities and offer explanations for the inertia in the transition to clean energy. A lack of understanding of this differentiation of needs is currently one of the key barriers to reducing energy poverty.

The purpose of the paper is to highlight emerging insights and to challenge emerging orthodoxies around energy access. The messages presented derive from empirical research carried out by members of the LCEDN and within the ENERGIA Gender and Energy Research Programme, which have produced new insights about the positive outcomes of mainstreaming gender into energy in policy discourse and practice.

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## Messages for effective interventions through taking a gender-orientated approach

This policy discussion paper is structured under three main messages which emerged from our findings to support more effective interventions to reduce energy poverty through taking a gender-oriented approach:

### MESSAGE 1

*More in-depth gender approaches are needed within energy initiatives to provide insight into gendered priorities for energy services;*

### MESSAGE 2

*Linked to Message 1, there is a great need for better understanding of the socio-cultural opportunities and barriers that motivate or hinder transitions to modern energy services*

### MESSAGE 3

*As a result of Messages 1 and 2, the empowerment of men and women should be seen as both an input into, and an outcome of, the development of more holistic approaches to energy delivery/provision*

Taking a gendered-oriented approach is central to all three messages and involves asking questions about who does what, who owns what, who makes decisions about what and how, and who gains and who loses in a planned intervention. The data gathered from asking these questions then need to be subjected to gender analysis which provides more holistic insights into the complex nature of energy demand and energy use within a household, enterprise, farm or community. These insights are key to understanding possible ways to enhance the gender equality of access and ensure gender equality of potential benefits of improved energy access. In what follows we explore each of these three messages in turn.

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# KEY MESSAGES

## MESSAGE 1

*More in-depth gender approaches are needed to support multi-tier energy access analysis; improved quality of access is NOT just about moving up tiers, but needs to include gendered needs, wants and values.*

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### Understanding energy poverty through tiers and gender analysis

This millennium has seen a change in understanding of energy poverty. While in the past, progress in reaching energy access targets was measured by a binary concept of access or no access (measured as physical availability), policy makers are now recognising that energy access revolves around the provision of energy services and that access also depends on the quality of the energy supply and affordability.

As data is still very scarce for this multidimensional conceptualisation, the World Bank ESMAP and Sustainable Energy for All (SEforAll) have introduced the Multi-Tier Framework (MTF), for tracking progress in energy access towards SDG7 and providing insights for interventions by policy and practice. In the MTF, lower tiers of electricity access allow for lighting and charging mobile phones, while higher tiers allow for washing machines and refrigerators, for instance. A separate set of criteria are used to express other tiers of access, for instance clean cooking through aspects such as emissions from cooking and safety. The first MTF reports came out in early 2018 and presented survey findings on the usability of electricity and multiple fuel sources for cooking for certain countries- the presentation of the data also reflected a recognition of the gendered use of energy services.

Whilst the MTF represents a major shift in thinking, the gendered base for analysis requires still further expansion if we are to understand the dynamics of energy poverty more completely, as well as how energy-source inertia might be challenged. The MTF data, for example, depends largely on comparisons between male and female headed households yet basing gender analysis on this distinction risks missing differences between households in these two groups (for example, not all female headed households are low-income).

Much can be learned from greater understanding of gendered issues of access and benefits of energy services within households. Within the household, understanding of different roles and needs and providing insights into on how to increase benefits for both men and women acts is needed to remove barriers to the energy transition. Division of roles and labour between women and men define demands for energy services linked to their allocated tasks. The decisions about access and control over energy services is also gendered, with men usually taking the final decision even about appliances linked to women's tasks. However, what we learn from Focus Group Discussions with women, conducted by members of the LCEDN with communities in Kenya is that seek to reduce their drudgery and save time by prioritising services such as water pumping and processing staple foods.

One of our key observations is that policymaking on energy access in respect of women's responsibilities has primarily been focused on cooking, while in reality their energy-related tasks are far wider. It appears rather ironic that so many resources and so much funding, purportedly for empowering women, has been devoted to a stereotypically feminized activity. We argue, therefore, for a dual approach, where on the one hand energy supply is targeted to support women in performing traditionally gendered activities in a manner that reduces their burden, and on the other hand energy supply provides opportunities to broaden activities and to move away from traditional tasks.

There is, therefore, we argue, a need for empirical data collection on energy access to be derived from a far more holistic view of gendered energy access (including both qualitative and quantitative data). This type of data is crucial, not only for monitoring progress, but also for providing explanations to inform interventions. There is also an equally urgent need for micro-understandings of how different socio-cultural environments affect generalized practices, in order to be able to adapt them to a range of different local customs and practices. Below we provide two examples of such micro understandings.

## Energy priorities seen through a gender lens

### Income generation

In this section of the paper we discuss gendered energy demand deduced from the differences in the types and scales of income-generating activities in which men or women are mostly represented. Case studies of interventions for productive uses of energy in Ghana and Tanzania [4] for instance show that male dominated sectors are more likely to benefit from grid electrification than female-dominated ones, from the consequent improvements in electricity supply. This is because men are typically involved in more and larger enterprises, which are more likely to use electricity and in larger quantities than female enterprises, thus making men's enterprises more interesting to private sector suppliers. Female led enterprises instead are more heavily involved in the use of lower-tier cooking fuels like firewood, charcoal and LPG although patterns of energy use are more complex than these crude divisions would suggest - women's productive use of electricity is also widespread, but because of the nature of their niche enterprises they tend to use it in smaller quantities.

Gendered energy needs are therefore specific to local opportunities and roles in income generation. For example, the small-scale diesel-based energy systems used in Mali for powering grinding machines for shea nuts reduce women's drudgery as well as saving a substantial amount of time [5]; secondary effects include women using this saved time for income-generating activities [5] or leisure activities [6]. Process heat and mechanical power are also important for informal/street food production, an entrepreneurial sector in which women feature highly in countries across the Global South [7].

Needs reflecting the socio-spatial location of energy supply are also gendered. While men are more highly represented in formalised enterprises at fixed locations, women are more highly represented in informal enterprises, which may have flexible locations, be mobile or may be based in the household. Informal enterprises and the social importance of the informal sector cannot be overlooked as a major dynamic in gendered energy needs, wants and values; the International Labour organization [8] estimates that over half the global labour force is employed in informal sector work, including over 90% of MSEs (Micro and Small Enterprises). This underlines the need to move the gender analysis of household energy needs substantially beyond cooking for the family and lighting.



Children using small lights to study, Rwanda  
© Sven Torfinn/ENERGIA

### Households

What can be learned by taking a gendered-oriented approach to household energy access is illustrated well by the example of Focus Group Discussions conducted by UK members of the LCEDN in Nakuru County in Kenya as part of community consultations conducted in the development of Solar Nano-Grid projects. These FGDs elicited patterns in household service preferences for different groups which gave a better understanding of gendered energy needs, wants and aspirations. In this instance, the distribution of preferences for energy services of male and female community elders are shown in Figures 1a, set against those of the women's focus group in Figure 1b<sup>2</sup>.

<sup>2</sup> It should be noted that there was some (small) overlap between the two groups, since one or two of the older women in the women's group also participated in the elders group.

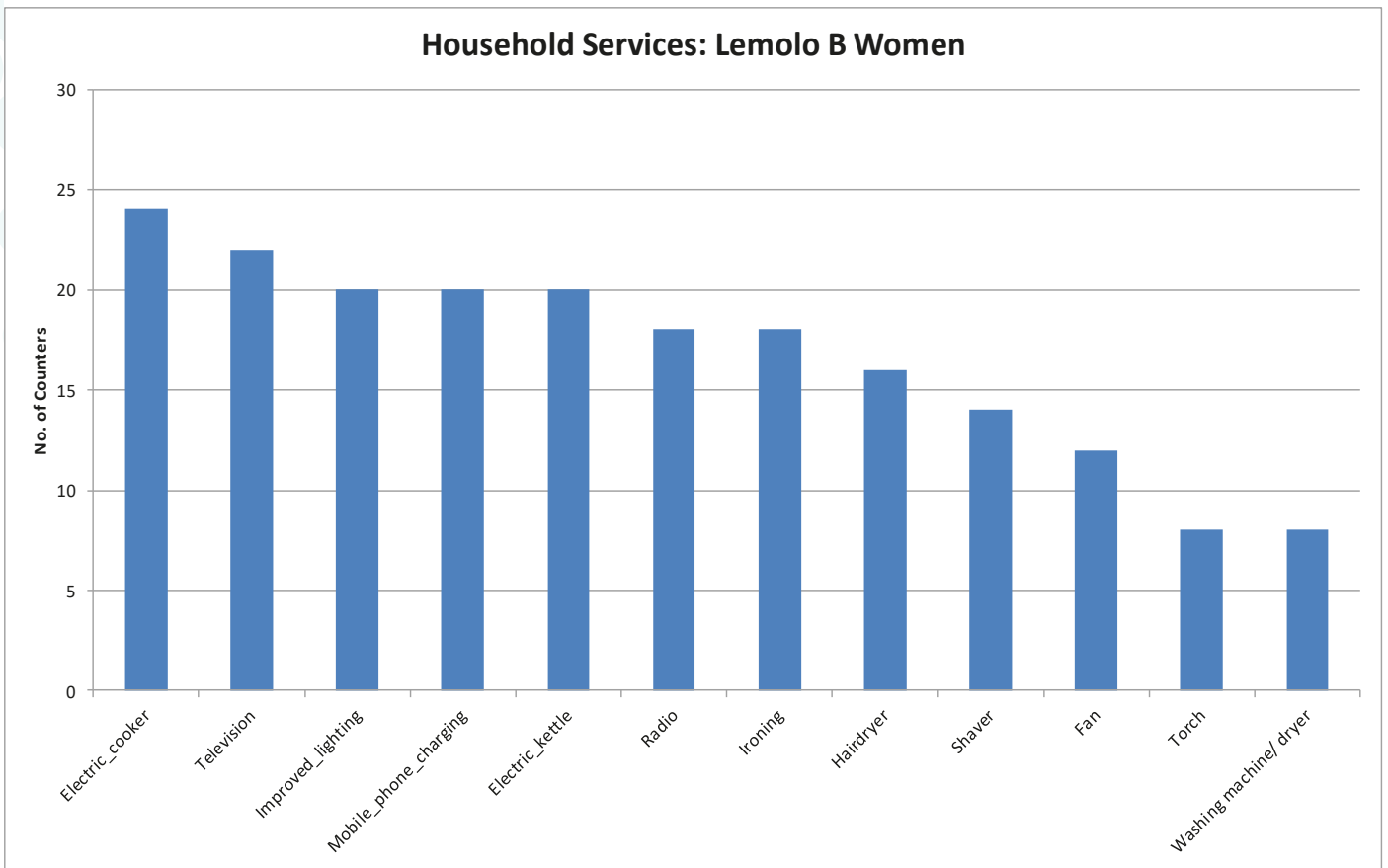


Figure 1a – Household energy service preferences - community elders;

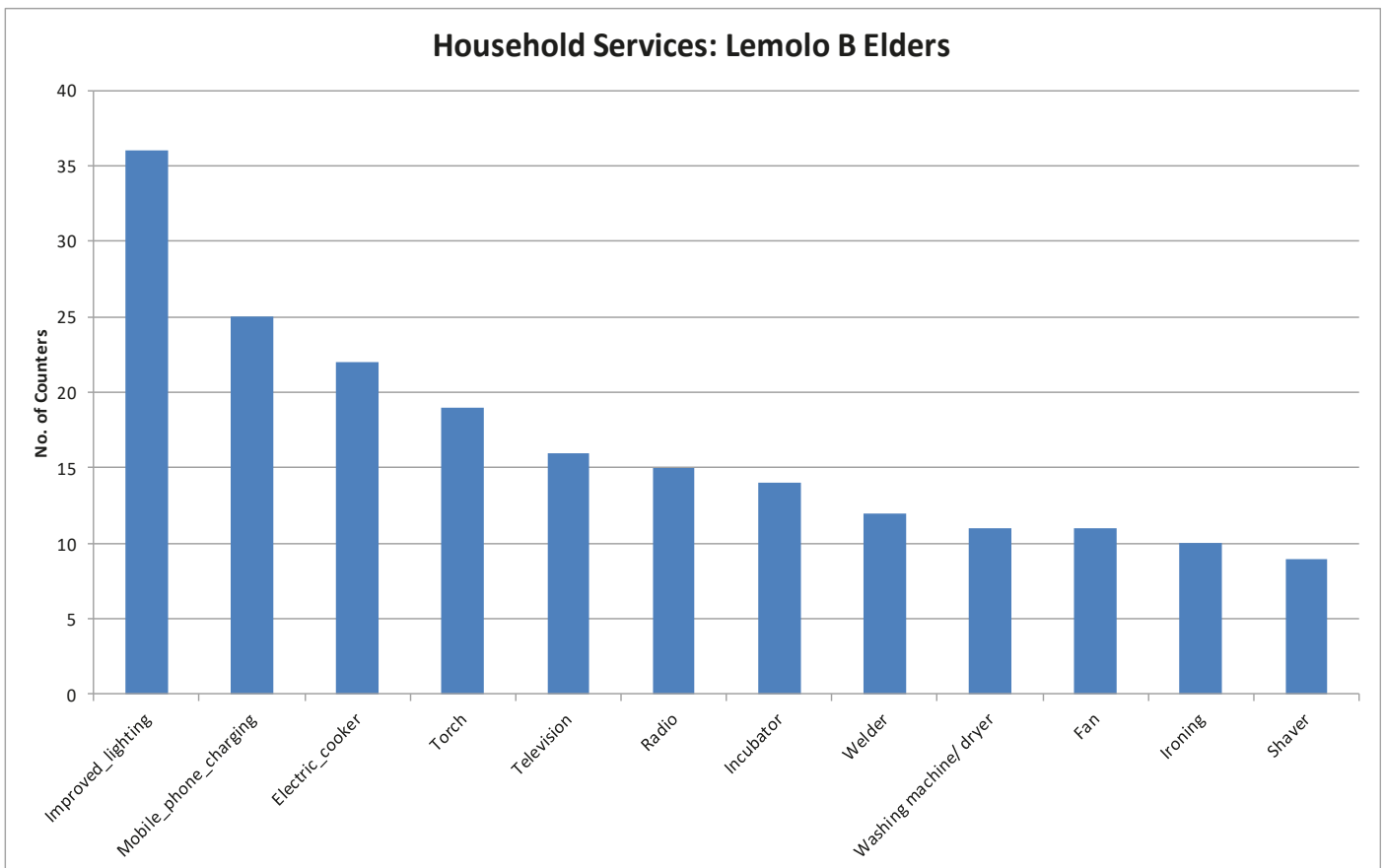


Figure 1b – household energy service preferences - community women



In this survey, the top priority for the elders' group (largely dominated by men) was improved lighting whereas for women it was electric cookers; improved lighting, however, was a concern for both groups, as much for security reasons as for improvement of the household environment.

This finding from Kenya is in line with a study by University of Oslo, TERI et al [9], from the ENERGIA research programme, which looked into gender divisions in the types of appliances associated with women and men's needs, decisions and ownership in Kenya, India and Nepal. Next to appliances which tend to be shared by all householders (television, fans), women tended to have initiated purchases in electric appliances that enhance their central, daily practices (Nepal: rice cookers, Kenya: electric water kettles, India: sewing machines) whereas men more often initiated acquisitions of television sets, radios, refrigerators and sound systems. For women, appliances associated with leisure activities and businesses dominate their interests, although the issue of personal safety is a large concern in some areas, for example in the case study area in Kenya, where 43% of the Kenyan respondents stated that women members of their households have been victim to violence when going to fetch firewood. Improved access to both cooking fuels and electricity, including through increasing the flexibility of planning tasks, can be a means to reduce this risk.

### Fuel Switching

Affordability and willingness to pay for energy services necessarily depends on the availability of alternatives, and also on the appreciation of the value of women's time. Where rural low-income households are already paying for energy services based on fuels such as kerosene and biomass, the willingness to pay for cleaner fuels may be higher than in areas where fuels wood or dung cake is collected 'for free'.

The recent PMUY scheme in India indicates the success of explicitly targeting low income women, having achieved over 57 million LPG connections (access to cylinders and stoves) to date. However, it is worth noting that the switch to LPG for those with access is still precarious as recent research [10] has shown that fuel stacking continues in households that have LPG connections and a right to subsidised refills. Sample households from Ranchi and Raipur still source 45 per cent of their cooking energy (in MJ) from fuel wood and 39 per cent from LPG. When asked about a hypothetical price increase of LPG, 39 per cent of LPG-using households indicated that they would absorb a price shock but continue using LPG, by reducing consumption levels and by supplementing through fuel stacking (fuel wood, dung cake); 14% indicated that they would stop using LPG altogether.



Usage of LPG in households, India.  
© Elavarasan Dindigul/ENERGIA

Although the above shows that affordability is crucial to achieve energy transitions, price reduction for the both male and female end users is not the only way to increase use of modern energy use. Affordability is not a one-size-fits-all concept, even where a modern energy supply can provide opportunities for income generation, whether through direct use in production or selling services in local business, flexibility of work hours through longer hours of high-quality light or improved mobility. Where modern energy access induces time-saving that can be used for income generation, the willingness to pay for these energy services will logically increase [11], however here again, a gender perspective and targeted approach is beneficial in ensuring that women have income generation opportunities<sup>3</sup>.

### Improving the quality of electricity supply

There are a number of pressures on governments to focus on increasing the supply of energy (especially electricity) as a political objective. The linkages between energy and economic growth are often envisaged through a focus on creating industry, or in rural areas, on income generation through high capacity grid power. On the other hand, there is pressure from voters who link an improved quality of life directly to electricity, something echoed in international commitments to reach the 'unserved'. A focus on providing levels of energy supply that allow higher tiers of access, however, can distract from the affordable access that both men and women in low-income households and informal sector businesses can realise – in energy access, 'good enough' is frequently a valuable temporising measure on the path to 'best', particularly where climate change and carbon emissions are factored in.

<sup>3</sup> These are issues that will be central to the approach adopted in the new DFID-funded Modern Energy Cooking Services programme being developed by members of the LCEDN.

Research shows that for the poor, one critical aspect of energy supply is reliability. For the poor, less preferred but more reliable energy sources may be chosen out of need and stacked as a precautionary measure, even where not immediately cost-effective. For those who can afford it, precautionary energy access strategies are critical to compensate for lack of reliability, one reason why diesel generators proliferate throughout areas in Africa which have allegedly been connected to the grid supply - otherwise, lack of reliability can create risks that are hard to bear for informal sector businesses.

Research in India and Kenya identifies scepticism about the quality and reliability of grid-based electricity as a reason for making people opt for off-grid lower tiers of electricity access [11]. For women working in the informal food sector, unreliable fuel supplies can diminish scant financial resources, thereby worsening an already uncertain working environment [7]. In Nepal, fuel shortages in 2015 led households who had switched to LPG to return to using fuelwood and charcoal, and even now, many are still hesitant to become dependent on LPG. The uncertainty about costs and reliability of electricity from the grid can lead to double investments in back-up (solar) and grid connections for those with sufficient income, increasing inequality with those who cannot afford this option. Rural health centres in Kenya were found to be investing in backup diesel generators to protect the equipment and medicines which rely on electricity. This is money diverted from paying staff and medicines.

Given the above, while low income households certainly have aspirations for the types of access described in the higher tiers, they opt to use non-grid electricity solutions and continue to rely on biomass for cooking to meet the needs/services they value (albeit at lower tiers) at prices they can afford. For example, many improvements in women's lives such as access to telecommunication, reduced time spent on household chores and home based livelihoods using electrical appliances (for example food processing – [5]) can be provided through Tier 1, Tier 2 and Tier 3 access. To achieve reduction in drudgery, community services for water collection and fuel based services such as cooking could complement the household electricity supply in the short term.

We consider that a focus on moving households to Tiers 4 and 5 through grid-based electricity and clean cooking should be (in at least some low-income country circumstances) a longer-term strategy. Here the focus can be on the energy needs which most households and enterprises with limited budgets prioritise, that can be met with lower tiers of energy provision. This strategy should not be seen as a failure nor should it be interpreted as the intention to promote unequal access in perpetuity, particularly where the benefits in terms of climate change mitigation are obvious. It is a short term strategy which does bring improvements in quality of life, which can be translated into women and men reaching the higher tiers in the longer term.

## Box 1 – Mainstreaming Gender in Research Programmes

A joint workshop coordinated by Energia and LCEDN in July 2018 brought together representatives from UK government departments, UK research councils, NGOs, Networking organizations, the private sector and others to discuss how best to mainstream gender more effectively within research programmes.

Gender mainstreaming can be defined as:

*“...the process of assessing the implications for women and men of any planned actions, including legislation, policies or programmes, in all areas and at all levels. It is a strategy for making women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programmes in all political, economic and societal spheres, so that women and men benefit equally and inequality is not perpetuated.” [23]*

Source: UNECOSOC, 1997

Discussion centred around how to help energy research programmes to develop a concrete gender strategy, or a Gender Action Plan (GAP). According to Energia's Gender mainstreaming toolkit, developing a GAP involves:

- Agreeing on a gender goal or objective (deciding what the project aims to achieve from a gender standpoint)
- Planning specific outcomes and activities to meet these gender goals by, for example:
  - (a) Implementation actions
  - (b) Institutionalisation of gender mainstreaming in the project or organisation, to create the long-term capacity to implement the GAP activities
- Designing a monitoring and evaluation framework to track the performance of gender activities
- Including gender in project documents, such as logical frameworks and annual work plans.” [24]

Key challenges involved in developing GAPS within energy research programmes were identified as relating to (i) data collection strategies, (ii) identification and application of appropriate methodologies, (iii) willingness of funders to pay for gender expertise and (iv) the danger that loose commitments to gender mainstreaming across whole programmes can be used as an excuse for a lack of specific action.

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## MESSAGE 2

*Policy-makers need to better understand the socio-cultural issues that motivate or hinder transitions to modern energy services (particularly for cooking), and how transition is influenced by factors not always directly linked to energy.*

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The set of factors affecting end-user motivations on energy choices discussed above on affordability, and reliability can be directly influenced by energy supply. However, there are also socio-cultural issues that motivate or hinder transitions, and although some of these can be addressed through a pro-active, targeted gender approach towards energy supply and other issues may be addressed under a more holistic set of measures - there are also socio-cultural issues beyond the scope of interventions that may stagnate transitions. In this section we provide examples of evidence from all of these, to indicate the need for an open mind as regards gender roles and gender differentiated values.

### Addressing sociocultural barriers through gender informed targeting

A gender responsive approach to energy supply also needs to take appliances and their use into account, and who within a household takes decisions on the purchase and use of appliances. Decision-making over household goods has a gendered dimension which can help develop appropriate targeting of messages. In research undertaken by ENERGIA researchers in Sri Lanka, women were found to be the main decision makers in relation to kitchen appliances, whereas men tended to make decisions about mobile phones and radios [12]. Particularly in more conservative rural communities, patterns of this kind can be expected to play a strong role in determining energy uses, differing from location to location according to unique socio-cultural dynamics.



Focus Group Discussion with community women, Nakuru county, Kenya © Jon Cloke

The Botswana Power Corporation (BPC) provides another example of the relevance of taking a gender approach. Through including gender perspectives in data collection about its potential clients, BPC realised that female-headed households often had more barriers to receiving a connection than male-headed households because of the dynamics of property ownership in the country. Addressing these barriers not only increased electricity access for the women and their families, it also benefitted the utility with an increased client base [12].

Examples of other practical steps to address gendered energy access barriers include: allowing sign-ups and connections to be taken in the name of males and females and the legal and administrative changes necessary to achieve this; reflecting the difference in male and female income by allowing smaller payments through more flexible payment schemes; innovative financial models that focus on the size (as well as the fluctuating and intermittent nature) of income streams, instead of insisting on rigid monthly or weekly payments; and payment schemes that minimise corruption/power of intermediaries and the possibility of male income diversion.

From the above it is clear that gendered approaches to energy needs, wants and values are indispensable, not only to research or data collection initiatives, but also for practitioners and NGOs who are operationalizing energy access, academics and policy-makers alike have much to learn from one another in expanding knowledge and understanding of gendered barriers, with a view not only to implementing practical steps which can help to induce change over time, but to devising more effective policies which incorporate energy access into frameworks of poverty alleviation and the mitigation of inequality.

### Holistic approaches to Gender norms

As argued above, the benefits of energy interventions will be experienced unequally as they are filtered through gendered roles and norms. However, a conscious approach combining energy intervention with other actions can establish opportunities for women that were previously unavailable, thereby not only increasing the quality of energy interventions, but also deploying them to initiate changes in gender norms. For example, supporting positive changes through which women will be able to enter profit-making sectors through the uptake of modern energy services, requires energy access to be complemented by holistic approaches to the commercial sector more generally (especially the informal sector), including support for the development of local enterprises [4].

Energy interventions that increase access to consumer goods for mass communication such as TV and radio are often seen as somehow 'less important' than those that raise income generation potential but access to such 'leisure' appliances can contribute positively to policies on changing gender norms (and reaching SDG 5) through increased awareness of rights and acceptable patterns of behaviour, including the unacceptability of gender-based violence in the household and community [13]. Generally, as important forms of communication, TVs can decrease a sense of marginalization in low-income households and can increase feelings of belonging and participating in citizenship. The mobile phone is also bringing changes as ownership increases even in remote areas. Phone ownership is gendered, with men tending to be the owners more frequently than women are, although women do have access to phone use. In India, men obtain agricultural reports via their phones while women maintain their social capital. There is also increased use of mobile phones for banking, for example in Kenya and Nepal [9] which can have positive impacts on women's economic independence.

## Policy Assumptions, Communication and Social Change

Policy interventions need to be very carefully thought through, as much in how they are transmitted as in the message they carry, because where sociocultural factors are not well understood they can have a substantial effect. Policies can also induce habits and expectations, as for instance in India, where for instance research into government and state policy suggests that the provision of appliances and free kerosene came to act as barriers to electric cooking with electricity by electricity replacing kerosene for lighting, and the kerosene then (partially) replacing traditional fuels in cooking [14]. Socio-cultural barriers such as ignorance over the cost of cooking with electricity and the incompatibility between the size of household cooking pots and the stove [15] can reinforce policy confusion, if sufficient depth of location- and community-specific understanding is not deployed to inform policy-makers in undertaking their work. There have been similar findings from a six-country study (drawn from Asia, Africa and Latin America; [16])

The transition to higher energy tiers or cleaner forms of energy may appear logical to planners and donors, but the behavioural changes necessary are not always perceived as desirable or appropriate by households or entrepreneurs. There are many examples, for instance, where the culture of cooking is engrained in preferences for traditional fuels. For example, smoke is used to preserve fish, meat and seeds; whilst wood continues to be used in traditional three-stone fires or ovens for preparation of specific traditional foods even where modern energy available e.g. tortillas, rotis, chapatis, pizza. Further, there can be gendered distinctions between which fuel is appropriate for men and women to use and such norms may be difficult to address. On the other hand, there are cases where energy supply has allowed a start in challenging norms- such as in women using electric appliances to replace heavily labour-intensive work.

Accepting that ingrained energy uses will not change in the short term has implications for policy support. For example, research in South Africa indicates that a focus on switching to LPG in the street food sector would be detrimental for the entrepreneurs, while a transition to cleaner use of traditional fuels would have many benefits to these micro scale enterprises. Cleaner use of fuels would reduce the health risks from use of fuel wood, risks of injuries and of fires, and of respiratory diseases [17].

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## MESSAGE 3

*Empowerment of men and women is both an input into and an outcome of holistic approaches to energy delivery/provision.*

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Gender should be a far more prevalent feature of ongoing discussions about energy entrepreneurship. Proactively incorporating women as agents in energy supply delivery, in every aspect from repairs and maintenance of technology to involvement in grid extension projects, is not only better for business but will also promote gender equality through enhancing women's equal access to the ensuing benefits for the community as a whole. It is this kind of understanding that can help focuses on the empowerment of women as both an input and an outcome of energy access.

Merely inputting energy into existing gendered structures of inequality, moreover, stands the risk of reinforcing those structures. In Kenya, Winther et al. [18] found that supposedly gender-neutral approaches to SHS project implementation resulted in only men becoming the sales agents for solar home systems, because they were the ones already involved in supply chains. Accordingly, drawing on the experiences of both the LCEDN and ENERGIA, this report rejects the idea of 'gender neutrality.' An energy initiative must understand and then work to disrupt, divert or combat gendered inequality or it will only serve to contribute to the continuation of gender inequality.

A reflection on approaches to strengthen women as energy entrepreneurs based on the experience of ENERGIA and its partners with over 4,000 women in clean energy businesses in seven countries [19] provides several lessons. Targeted mentoring to help women systematically address barriers and build confidence by demystifying the concept of 'business' (e.g. how to do financial planning and analysis), for example, has been found to be particularly effective in helping women develop as entrepreneurs [19] [20]. Another major business barrier to women becoming entrepreneurs is access to finance, so that as an effective component of a range of facilitating initiatives, appropriate access to finance will require intermediaries who can build links with local financial institutions and act as a partial risk guarantor. With such measures in place, women are not only better placed to help themselves and their families, they can also play an essential role in reaching the 'last mile' of energy access in a sustainable manner.

Evidence also shows that incorporating women into the value chain not only enhances the benefits to women and their families, but also changes the perceptions of both women and men about women's capabilities. Evidence from Kenya for example found that women's hands-on involvement in technical aspects of decentralised solar energy systems together with their customer service abilities also positively affected men's beliefs in what a woman can do, challenging existing norms. Women's involvement, particularly as sales agents, also had the perceived effect that the quality of services improved (less theft, more efficient revenue collection) with the consequence that the system's viability increased [18].

In order to address these issues, an increasing experience-base of large-scale conscious involvement of women as small/micro entrepreneurs in energy supply has been developing in low-income countries such as Solar Sister, Frontier markets, Enventure, SSP (India) some of them in partnership with ENERGIA. With the support for market development and building value chains, including finding appropriate forms of finance, these enterprises have a large potential to grow and to contribute to energy access solutions.

Identifying what works at the project level also depends on generating locally-situated, gendered knowledge for understanding the community. For instance, experience gained from ENERGIA's Women's Economic Empowerment Programmes has shown that access can be promoted by providing a range of products that meets clients' needs and capacity to pay, and Kopernik, a social enterprise NGO, in Indonesia have trained more than 500 women to sell a range of technologies including solar lighting, improved cookstoves and water purifiers. As of December 2016, more than 36,000 different products had been sold by women which are estimated to have benefited around 180,000 people. Meanwhile, in Tanzania the organization Solar Sister supplies solar lanterns which their female agents sell to fishermen as quality lights for the traditional night fishing – consequently, both women's and men's incomes have benefited.

Some gender-allocated character traits can be a positive factor in favour of women's empowerment through energy initiatives - for instance, trust. Trust is a key factor in the way that many communities work [21] and incorporating trust in women as community members in a variety of roles in the energy value chain is an innovative approach to improve availability and quality of supply at local level while promoting energy access. Another mechanism for using positive gendered norms comes through the ways in which women are able to connect to their customers - as one example, a decentralised solar project in rural Kenya found that women performed well as sales agents because they were considered better than men at listening to customers [15].

Interventions aimed at increasing empowerment of women through involvement in energy supply and through use of energy services will inevitably sometimes face substantial pressures from negative assumptions about women and taboos about what constitute suitable activities. There are almost invariably institutional biases (rooted in gender norms) about what is right and proper for women, such as 'women do not do technology' or that 'it is not safe for them to travel to rural areas'; in the particular areas of energy and technology, furthermore, which remain strongly male-dominated even in western liberal democracies, the socially constructed barriers are even stronger.

Therefore, when women are the target of incorporation into the energy value chain, making sure men understand the reasons why and the benefits that accrue to their households and communities can help overcome resistance. One aspect of the Mali Multifunctional Platform programme consisted of convincing the village leadership (which is typically male dominated) about the value of targeting women. Project evaluation deemed this one of the more successful aspects in a project in which women were the managers of the diesel engine providing a range of services, while men operated the system [22].

Positive examples of women breaking patterns with supportive energy supply to reduce drudgery and the need for physical strength, to increase flexibility of tasks over the day and to increase the diversity of opportunities for income generation, indicate that energy has a role to play in reducing inequity and changing roles. In combination with further education, exposure to role models, and associations to scale up small female businesses, energy access can support transforming current gender roles in the longer term.

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# CONCLUDING REMARKS

Drawing on the preceding discussions, we conclude via a series of recommendations for policymakers, researchers and programme funders

- Using tools which track progress in energy access by focusing on moving in a smooth progression from one tier of energy access to the next runs the risk of neglecting the most urgent energy needs which households and enterprises with limited budgets prioritise. There needs to be greater recognition of how households with limited incomes and informal small-scale enterprises can see immediate benefits from access to lower tiers, especially for women.
- The production of empirical sex-disaggregated data is a positive move. However, we need more holistic empirical qualitative and quantitative data, which provides explanations, e.g. sociocultural factors that influence why women adopt improved cooked stoves while other women in similar circumstances do not. Up-scaling energy access needs more than data collection as a monitoring tool; the whole energy project cycle needs to be implemented using a gender approach. Such an approach would help identify the cultural and institutional barriers to women acquiring access to the energy services they would prioritise – which are inadvertently overlooked unless women are asked about their priorities and aspirations.
- We need to prioritise the application of a gender sensitive approach that moves beyond the simple classification of female-headed households and male-headed households showing how the low control by women over household decisions in the latter can be overcome as a barrier to meeting energy demands by taking a gender approach.
- Alongside this, women need to be promoted as active agents in energy supply delivery- not only is this better for business but it will also promote gender equality in access and benefits. Incorporating women into the value chain by providing them with additional support such as technical training benefits women and their families and helps to change perceptions of both women and men about women's capabilities.
- A gender approach also needs to highlight that household energy and energy for enterprises are not separate considerations. The household can be a centre of production, particularly for women, and the social importance of the informal sector cannot be overlooked. .
- Evidence also shows that improving the quality of supply means a supply appropriate for the informal sector livelihood needs of the distinct and joint businesses run by women and men. In the short term, meeting needs may mean continued use of decentralised diesel-powered mechanical energy appliances as well as woodfuels and LPG for heat intensive processes, and fuel wood for certain foods. In the longer term, access to a higher tier energy supply (based on renewables through decentralised or centralised production) would be possible –especially if the barriers were economic and incomes increase and costs come down.
- Finally, the subtle informal and overt formal social norms and rules by which women are socially and spatially marginalized from access to modern energy services are powerful barriers to energy transitions and securing the benefits from energy. Energy poverty and access is shaped by gendered understandings and practices. There are different ways in which issues of gender can be positively addressed, however progress requires us to move beyond the expectation that technology and mere electricity access can by themselves address gendered inequalities.

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The Low Carbon Energy for Development Network (LCEDN) brings together researchers, policy-makers, practitioners and the private sector from across the United Kingdom (and indeed the rest of the world) to expand research capacity around low-carbon energy development in the Global South. The LCEDN was launched in January 2012 centred around hubs at the Durham Energy Institute and Loughborough University.

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ENERGIA, the International Network on Gender and Sustainable Energy, is an international network, working with 36 partners in 18 countries in Africa and Asia. Our vision is that women and men have equal and equitable access to and control over sustainable energy services as an essential human right to development. To achieve this, we:

- contribute to energy access for all by scaling up the delivery of energy services through women-led micro- and small businesses;
- advocate for and provide technical support to gender mainstreaming in energy policies and programmes;
- provide, through research, an evidence base for improving energy investment effectiveness;
- raise awareness and enhance knowledge of issues related to gender and energy through networking and knowledge products.

ENERGIA is hosted by Hivos, an international organization that seeks new solutions to persistent global issues.

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