

eCook and Gender in Tanzania

March 2019 Final Report



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Executive Summary

This report presents a **gendered analysis of how the eCook concept might fit into the Tanzanian context**, with the aim of informing the development of a battery-supported electric cooking concept, eCook. It is part of a broader programme of work, designed to identify and investigate the opportunities and challenges that await in potentially significant markets such as Tanzania.

Clancy et al. (2012) categorised the potential gendered effects of modern and efficient energy solutions into time saving and drudgery reduction; income generation; resistance to change and transformation of gender roles. In this study, Clancy et al.'s (2012) categories are used as a framework to consider the potential gendered impacts, barriers and drivers of the eCook concept.

Time saving & drudgery reduction - eCook can make cooking **quicker and easier**. The people who could save most time and effort are those who collect fuelwood. Whilst they could benefit from adopting eCook products/services, they are not eCook's initial target market because they have no existing expenditure to repay the capital costs of the equipment. However, transporting bulky fuels such as a sack of charcoal and even an LPG cylinder from the point of sale to the kitchen is still an arduous task that reoccurs monthly and could be substituted with carrying a new set of batteries once every six years. What is more, **pressing a button is much quicker than lighting & tending fires** and efficient appliances such as **the electric pressure cooker can cut cooking times in half**.

Income generation - cooking is a productive activity that is often overlooked in energy access programs. There is a clear opportunity to apply the time saved to create new livelihoods for women who adopt eCook systems by cooking more food for sale. Of course, there is also the potential to enhance the existing livelihoods of street vendors, restaurants and shops selling cooked food.

Resistance to change - the evidence from the choice modelling surveys suggests that **future marketing campaigns should target both genders**, as **the decision to purchase is likely to be made together in most Tanzanian households**. eCook is likely to be an aspirational product/service for both men and women, as not only can it transform the kitchen, but on most days, the energy left in the battery can also enable access to TV, lights, radio, mobile phone charging and other low power energy services. **Changing the perception of pressure cookers from dangerous to safe** and the **perception of electricity as too expensive for cooking** are likely to be key enablers for eCook.

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Transformation of gender roles - eCook will make cooking quicker and easier, which may be the trigger for a slight gender shift in responsibilities, as **men may be willing to take on more responsibility in the kitchen.**

A case study of female-led social enterprise in the energy access sector was undertaken to understand how gendered business models could accelerate the uptake of future eCook products/services:

Solar Sister case study: key findings

Solar Sister uses an Avon-style product distribution model as an innovative method of spreading solar technology. The Avon business model works by recruiting sales representative who bring their own social networks. Solar Sister recruits, trains and mentors the sales reps, who are expected to invest their own capital to buy the products and then resell them, firstly to family members and friends, then as their circle expands, to friends of friends and finally their community at large. Whilst **this could work for efficient electric cooking appliances without batteries**, such as electric pressure cookers, the business model will clearly need to be adapted to **focus on finding new subscribers for eCook services**, as eCook products themselves are likely to cost several hundreds of dollars.

The Avon-style business model relies on word of mouth and capitalises on the fact that trust and familiarity between the sales rep and the consumers (family, friends and acquaintances) is more persuasive than conventional sales methods that rely on selling to strangers. In fact, this business model is already employed to market improved biomass & biofuel cookstoves. The aspirational nature of eCook is likely to provide a strong driver to attract new users. **By watching someone you are familiar with cook the dishes you know, asking them questions and trying it out yourself is likely to help many to overcome the reservations they may have about this new technology.** Another advantage of the Avon-style business model is that the sales agents can also offer after-sales services, supplying specialist parts such as sealing rings for pressure cookers and offering friendly advice on how to make the tastiest meals with this new equipment.

Successfully **leveraging existing social media communities** could greatly expand the scalability of the Avon business model as a marketing strategy for eCook. **Cooking-themed Facebook groups in East Africa with over 1 million users and local food bloggers regularly receive hundreds of thousands of hits** on their video recipes on YouTube.

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1 Introduction

This report presents one part of the detailed in country research carried out to explore the market for eCook in Tanzania. In particular, this in country work aims to gain much greater insight into culturally distinct cooking practices and explore how compatible they are with battery-supported electric cooking. The report is rich with detail and is intended to provide decision makers, practitioners and researchers with new knowledge and evidence.

This report presents the key learning points from a gendered analysis of how eCook might fit into the Tanzanian context to inform the future development of eCook within Tanzania. It is one component of a broader study designed to assess the opportunities and challenges that lay ahead for eCook in high impact potential markets, such as Tanzania, funded through Innovate UK's Energy Catalyst Round 4 by DfID UK Aid and Gamos Ltd. (<https://elstove.com/innovate-reports/>). A much deeper analysis of the data collected during this project was supported by the Modern Energy Cooking Services (MECS) programme, which included the writing of this report.

The overall aims of the Innovate project, plus the series of interrelated projects that precede and follow on from it are summarised in in *Appendix A: Problem statement and background to Innovate eCook project* and *Appendix 2: About the Modern Energy Cooking Services (MECS) Programme*.

1.1 Background

1.1.1 Context of the potential landscape change by eCook

The use of biomass and solid fuels for cooking is the everyday experience of nearly 3 billion people. This pervasive use of solid fuels and traditional cookstoves results in high levels of household air pollution with serious health impacts; extensive daily drudgery required to collect fuels, light and tend fires; and environmental degradation. Where households seek to use 'clean' fuels, they are often hindered by lack of access to affordable and reliable electricity and/or LPG. The enduring problem of biomass cooking is discussed further in *Appendix A: Problem statement and background to Innovate eCook project*, which not only describes the scale of the problem, but also how changes in renewable energy technology and energy storage open up new possibilities for addressing it.

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1.1.2 Introducing ‘eCook’

eCook is a potentially transformative battery-supported electric cooking concept designed to offer access to clean cooking and electricity to poorer households (HHs) currently cooking on charcoal or other polluting fuels (Batchelor 2013; Batchelor 2015a; Batchelor 2015b). Enabling affordable electric cooking sourced from renewable energy technologies, could also provide households with sustainable, reliable, modern energy for a variety of other purposes.

A series of initial feasibility studies were funded by DfID UK AID under the PEAKS mechanism (available from <https://elstove.com/dfid-uk-aid-reports/>). Slade (2015) investigated the technical viability of the proposition, highlighting the need for further work defining the performance of various battery chemistries under high discharge and elevated temperature. Leach & Oduro (2015) constructed an economic model, breaking down PV-eCook into its component parts and tracking key price trends, concluding that by 2020, monthly repayments on PV-eCook were likely to be comparable with the cost of cooking on charcoal. Brown & Sumanik-Leary’s (2015), review of behavioural change challenges highlighted two distinct opportunities, which open up very different markets for eCook:

- PV-eCook uses a PV array, charge controller and battery in a comparable configuration to the popular Solar Home System (SHS) and is best matched with rural, off-grid contexts.
- Grid-eCook uses a mains-fed AC charger and battery to create distributed HH storage for unreliable or unbalanced grids and is expected to best meet the needs of people living in urban slums or peri-urban areas at the fringes of the grid (or on a mini-grid) where blackouts are common.

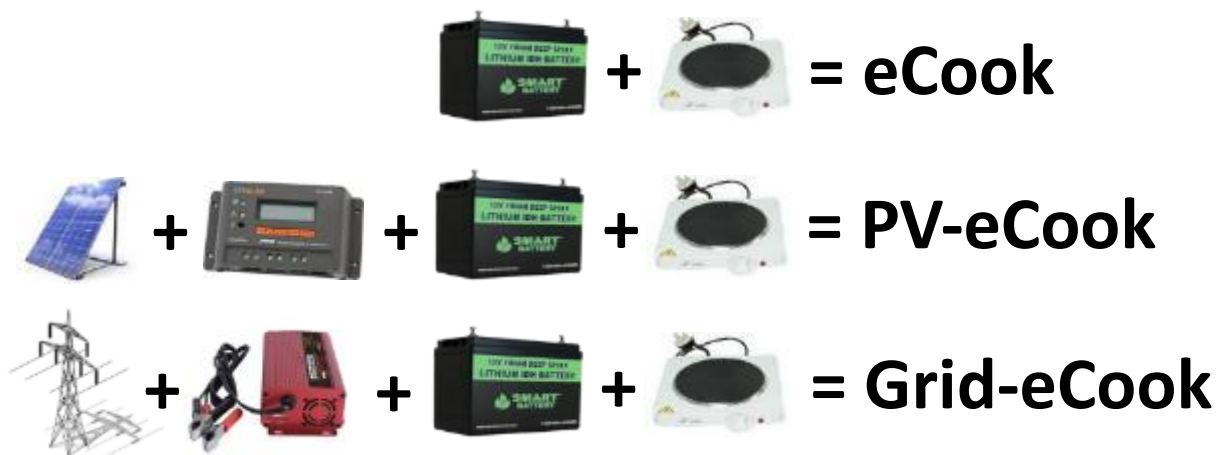


Figure 1: Pictorial definitions of ‘eCook’ terminology used in this report.

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1.1.3 eCook in Tanzania

Given the technical and socio-economic feasibility of the systems in the near future, Gamos, Loughborough University and the University of Surrey have sought to identify where to focus initial marketing for eCook. Each country has unique market dynamics that must be understood in order to determine which market segments to target are and how best to reach them. Leary et al. (2018) carried out a global market assessment, which revealed Tanzania as the second most viable context for PV-eCook, due to its strong SHS industry and the fact that it is one of the world's biggest charcoal markets, creating several global deforestation hotspots.

The accompanying reports from the other activities carried out in Tanzania can be found at: <https://elstove.com/innovate-reports/>.

1.2 Energy and gender

Energy poverty has a particular gender bias, especially in developing countries where women are generally primarily responsible for energy procurement and management, which tends to infringe on the time available for income generating, educational, self-improvement and/or leisure activities (Habtezion 2013). Women and girls being the main energy producers in a family; they are burdened with the responsibility to source energy options for the daily needs of their families (TANGSEN & HIVOS 2012). The wide use of biomass fuels, which come from an environment that in many contexts is depreciating, resulting in their increasing scarcity puts a toll on women, especially poorer women in rural areas (Habtezion 2013) and most notably in female-headed households (Cecelski 2002).

Today, gender equality should be integrated into the goals of all development projects. The UN's Sustainable Development Goals (SDGs) are a universal call to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. The SDGs came into effect in 2016 and set targets to guide UN policy and funding until 2030. The SDGs are interconnected making the success of one goal dependent on solving issues in another goal.

Leary and Batchelor (2018) state that “currently only 16% of Tanzanians (9 million) have access to the national grid, however only 1% (600,000) use electricity as their primary cooking fuel” while WEF (2017) ranks Tanzania 68th out of 144 countries in terms of women's economic participation. Cooking is the main energy need of poorer households and lack of access to modern energy for cooking is a burden that falls

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disproportionately upon women. The WHO estimated about 18,990 deaths in Tanzania from indoor air pollution in 2007, the vast majority of whom are women and children (TANGSEN & HIVOS 2012).

Achieving SDG 5 (gender equality and empowerment of all women and girls), very much depends on access to affordable and reliable energy, i.e. SDG 7. Women, especially in Tanzania, are estimated to work for 14 hours a day of unpaid household chores: fetching firewood, cooking, washing, farming (they produce 60% of all food crop). Without commitments and actions to address cooking energy concerns, women in Tanzania will continue to be oppressed, discriminated against and suffer the consequences of energy poverty (TANGSEN & HIVOS 2012). eCook offers the potential to extend access to clean cooking to households in off-grid and weak-grid regions. As such, it directly addresses SDG 7, however it clearly has the potential to also make a significant contribution towards SDG 5. By considering the potential impacts of eCook on each gender, we can understand how the positive impacts can be amplified and negative impacts mitigated.



Figure 2: Regina Sago cooking ugali on an early prototype eCook system in Dar es Salaam.

1.3 Gender Mainstreaming

EIGE, (2017, p. 1) state that gender mainstreaming: “involves the integration of a gender perspective into the preparation, design, implementation, monitoring and evaluation of policies, regulatory measures and spending programmes, with a view to promoting equality between women and men, and combating

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discrimination”. This process ensures that policies and legislations consider the needs of all citizens; women and men, boys and girls. Energia, (2019) break down the key steps to achieving gender mainstreaming as:

- Assess the likely implications of specific projects on women and men.
- Build consensus among stakeholders on gender sensitive approaches.
- Determine gender goals and strategies for specific programmes or projects and designing activities to achieve these.
- Develop gender sensitive monitoring strategies.

TANGSEN is at the forefront of gender mainstreaming into the energy sector in Tanzania. They hosted the validation workshop for the Sustainable Energy for All (SE4All) gender action plan, which had the goal of establishing equal opportunities for women and men in access to and control over sustainable energy services as an essential right to development. To achieve this goal, the workshop’s specific objectives were:

- To effectively mainstream gender on SE4All related policies, strategies, plans, programs, projects and budgets.
- Promote women’s employment and economic empowerment in the SE4All initiative.

Clancy and Stockbridge (2017) ,say that the volume of research on the relationship between gender and energy is still relatively small although many efforts are being made to fill the gaps. Access to sustainable energy can transform the lives of both men and women in a lot of ways however, energy interventions are generally gender blind with little attention given to women’s interests. Energy interventions impact women and men differently and without considering this, the policies made risk missing the key targets of the different roles played by women and men inside and outside the home which require different energy demands. There is evidence of gendered approaches at the project level, especially for the over-represented female headed households in the low-income categories and it has proved to have positive impacts on the livelihood of rural families. In these cases, gendered approaches have achieved increased connection rates.

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1.4 Aim and objectives

The aim of this study is to engender the eCook research, design and implementation processes to ensure that they yield the maximum possible benefits for both genders.

This will be achieved by using Tanzania as a case study to:

- 1) identify the likely impacts of eCook on women and men, looking for opportunities to maximise the positive impacts, e.g. by connecting time savings with specific entrepreneurial opportunities; and
- 2) identify gender-specific marketing strategies to enable eCook to rapidly reach scale.

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2 Methodology

The findings presented in this report are based upon data obtained from the following sources:

- A literature review on gender and energy issues in Tanzania.
- Notes taken during personal interviews and focus groups (see Figure 3) with research participants undertaken during the eCook Tanzania cooking diaries study
 - 20 participants were provided with new electric cooking appliances (pressure cookers, rice cookers, thermo-pots) and they were expected to record their cooking for 6 weeks; with emphasis on energy readings, quantity and type of food being cooked.
- Analysis of gender-focussed questions from the eCook Tanzania choice modelling surveys of 200 participants.
- Analysis of summary reports for eCook Tanzania focus groups carried out in Ubungo, Moshi, Kibindu and Kifuru.
- Contributions from TANGSEN through interviews and notes from workshops.



Figure 3: Practical demonstration of early eCook prototypes at focus groups held in Kifuru (left) and Kibindu (right).

Clancy et al. (2012) categorised the potential gendered effects of modern and efficient energy solutions into time saving and drudgery reduction; income generation; resistance to change and transformation of gender roles. In the following section, Clancy et al.'s (2012) factors are used as a framework to consider the potential impact of the eCook concept.

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3 Results

3.1 Time saving and drudgery reduction

Using energy efficient appliances and practices can drastically change the amount of time required for cooking and its associated chores. Improved energy solutions that are also time-efficient and can be left unattended, like the electric pressure cooker, free up women’s time for other activities. They can also reduce the hard labour that many women have to experience on a regular basis, in particular collecting biomass fuels like firewood far from home and then coming back to domestic responsibilities including lighting and tending fires (Figure 4). What is more, efficient electric cooking appliances can also speed up the cooking process itself: using the electric pressure cooker cuts the cooking time for long boiling dishes like beans in half.



Figure 4: Lighting a charcoal stove regularly takes 10 minutes and can easily exceed half an hour if the charcoal is wet.

ALTHOUGH PEOPLE WHO COLLECT THEIR COOKING FUEL ARE NOT ECOOK'S PRIMARY TARGET MARKET BECAUSE THERE IS NO EXISTING EXPENDITURE TO REPAY THE CAPITAL COSTS OF THE EQUIPMENT, TRANSPORTING BULKY FUELS SUCH AS A SACK OF CHARCOAL AND EVEN AN LPG CYLINDER FROM THE POINT OF SALE TO THE KITCHEN IS STILL AN ARDUOUS TASK.

WHAT IS MORE, PRESSING A BUTTON IS MUCH QUICKER THAN LIGHTING & TENDING FIRES; & EFFICIENT APPLIANCES SUCH AS THE ELECTRIC PRESSURE COOKER CAN CUT COOKING TIMES IN HALF.

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3.2 Income generation

With time saved from using efficient cooking technologies, women could get involved in economic activities that will improve their financial state. Financial freedom for women gives them the power to make more choices in their lives, even more so for female-headed families. For example, Solar Sister contributes to women economic empowerment by providing training, business mentorship, technology and leadership skills to enable women kickstart a sustainable clean energy business (see case study below). Men often report that the level of power available at home from solar home systems is often not enough to operate the type of equipment they would use in enterprises, such as welding gear and motors. However, eCook presents an opportunity to enhance an existing livelihood for restaurant owners, street vendors and shop owners who sell cooked or partially cooked food. What is more, eCook systems are likely to be significantly larger than the current generation of solar home systems that are designed for lighting and other low power applications. This opens the door to a larger range of appliances that can complement cooking appliances and greatly increase the potential to enhance existing and create new livelihoods, such as irons or water pumps.

COOKING IS A PRODUCTIVE ACTIVITY THAT IS OFTEN OVERLOOKED IN ENERGY ACCESS PROGRAMS. THERE IS A CLEAR OPPORTUNITY TO APPLY THE TIME SAVED TO CREATE NEW LIVELIHOODS FOR WOMEN WHO ADOPT ECOOK SYSTEMS BY COOKING MORE FOOD FOR SALE.

OF COURSE, THERE IS ALSO THE POTENTIAL TO ENHANCE THE EXISTING LIVELIHOODS OF STREET VENDORS, RESTAURANTS AND SHOPS SELLING COOKED FOOD.

3.3 Resistance to change

Not all technologies are received with open arms; some are met with suspicion and uncertainty. For instance, the electric pressure cooker was met with uncertainty from most eCook Tanzania research participants due to the reputation of pressure cookers ‘exploding’. The author’s own cousins have been burned by an older stove-top pressure cooker, which they had pried open to taste some of the food whilst their parents were out of the house, resulting in an explosion of scalding food and water. Unlike the old pressure cookers, the new improved electric pressure cookers have a variety of new safety features; an electric pressure cooker (Figure 5) does not allow for opening whilst it is still in pressure, it locks up and only opens after pressure has been released from the pressure valve or it has been cooled down. However, changing the perception of pressure cookers as dangerous and disassociating the electric pressure cooker with older models is likely to remain a significant challenge.

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There is also a false perception in Tanzania (and across much of Sub-Saharan Africa) that electricity is too expensive to cook with. In fact, the evidence from the cooking diaries shows the opposite, i.e. that most participants saved money by switching from charcoal and/or LPG to electricity. Changing this perception will not be easy, but will be a critical enabler for future eCook products/services.

CHANGING THE PERCEPTION OF PRESSURE COOKERS FROM DANGEROUS TO SAFE & OF ELECTRICITY AS EXPENSIVE TO CHEAP ARE LIKELY TO BE KEY ENABLERS FOR ECOOK.

As opposed to Clancy *et al.*'s (2012) findings, the discrete choice modelling results from our eCook Tanzania study revealed that the decision to acquire an eCook product/service is likely to be a joint decision, rather than solely a male responsibility. Figure 6 shows that the result was slightly different for a solar panel than for a cookstove, with the HHs not making joint decisions reporting that the male head of HH was more likely to decide on the solar panel, whilst the female head of HH was more likely to decide on the cookstove. However, as Clancy *et al.* (2012) suggests, women are likely to remain the managers of the purchased equipment.



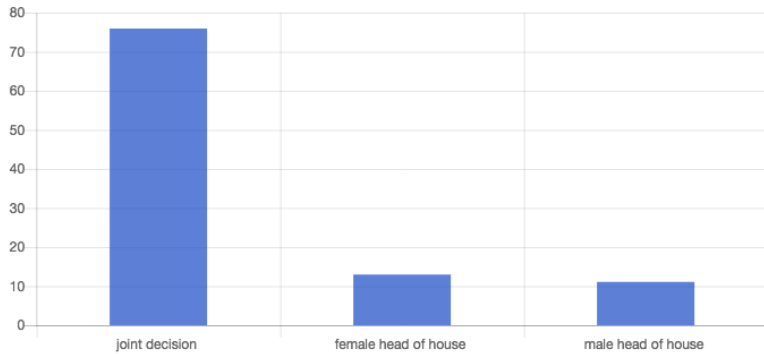
Figure 5: Esther Mwangamila cooking ndizi nyama in an electric pressure cooker at a stakeholder event in Dar es Salaam.

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129 - If you were going to purchase a new cooking device, who in your household would be the main decision maker

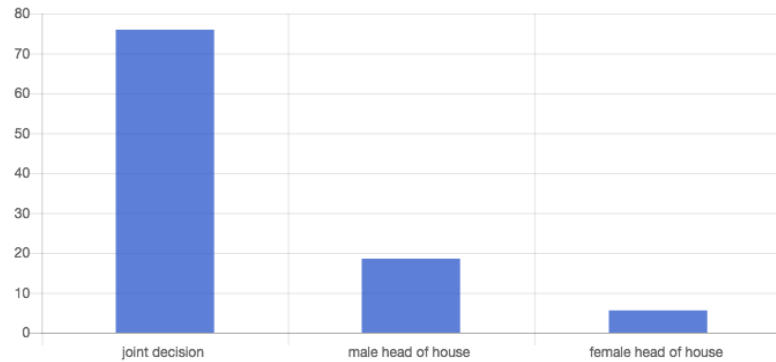
TIPO:"SELECT_ONE".54 de 54 encuestados respondieron esta pregunta.(0 registros sin datos)



FUTURE MARKETING CAMPAIGNS SHOULD TARGET BOTH GENDERS, AS THE DECISION TO PURCHASE IS LIKELY TO BE MADE TOGETHER IN MOST TANZANIAN HOUSEHOLDS.

130 - if you were going to purchase a solar panel for the house, who in your household would be the main decision maker

TIPO:"SELECT_ONE".54 de 54 encuestados respondieron esta pregunta.(0 registros sin datos)



E-COOK IS LIKELY TO BE AN ASPIRATIONAL PRODUCT/SERVICE FOR BOTH MEN AND WOMEN, AS NOT ONLY CAN IT TRANSFORM THE KITCHEN, BUT ON MOST DAYS, THE ENERGY LEFT IN THE BATTERY CAN ALSO ENABLE ACCESS TO TV, LIGHTS, RADIO, MOBILE PHONE CHARGING AND OTHER LOW POWER ENERGY SERVICES.

Figure 6: Preliminary discrete choice modelling results on household decision making.

3.4 Transformation of gender roles

Improved energy solutions have the potential to benefit all the members of the household, but in different ways. eCook technology has the potential to shift existing gender roles, not only by creating more free time and enhancing livelihood opportunities for women, but potentially also by encouraging men to do more cooking.

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The focus group discussions confirmed that cooking is generally a woman's responsibility, but that men are starting to become involved, especially in the preparation of quicker and easier foods/drinks. The women in Ubungo noted that in the old times, when the patriarchal system was unchallenged, women did all the cooking as men did what men did best; give instructions and provide for the family. It was a taboo for men to cook and it was witchcraft if a man was seen cooking. Some men would perhaps have liked to cook, but cultural norms didn't allow. However, in this generation some men help their women in the households. The Ubungo group felt that most men have little skill regarding cooking and some women preferred to cook themselves. They also noted that men prefer to prepare quick foods, often taking shortcuts. As a result, they can often cook faster, but they are poor when it comes to energy conservation and budgeting and usually use many utensils and don't clean up after themselves.

THE COMMENT ABOUT MEN LIKING 'QUICK FOODS' IS INSIGHTFUL. IT IS LIKELY THAT ECOOK WILL MAKE COOKING QUICKER AND EASIER, AND THAT MAY BE THE TRIGGER FOR A SLIGHT GENDER SHIFT IN RESPONSIBILITIES - BY BUILDING ON MEN'S NEED TO DO THINGS 'QUICKLY'.

The Moshi focus group revealed that it was mostly women that did the cooking while the man is at work. Rarely do men cook even when they are in the home due to cultural norms. Only when the woman is sick or travelling does the man cook. However, they all agreed that with eCookers, men might be willing to try, as without having to light and tend a fire, cooking is significantly easier.

In Kibindu, the focus group participants also stated that women cook all the time, with female children helping their mothers to cook. One lady, who was supported by the rest of the group, suggested that men do not cook because they think that this will give the women power to control them. However, in Ubungo there were two households where men did some cooking. One lady mentioned that although she did most of the cooking, her husband at least prepared the tea and, in another household, they share the cooking 50/50. However, another lady joked that her husband only 'gave recommendations' on what/how to cook.

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eCook may be particularly attractive to men (Figure 7), as efficient electric cooking appliances can cook faster, require less skill to operate and minimise cleaning requirements; electric pressure cookers and rice cookers have a single pot to clean, a non-stick coating on the inside and no soot to scrub off the outside. Burning food on these appliances is also much less likely, because in the electric pressure cooker, the water is sealed inside, and both have automatic control that cuts off the power when the pot gets too hot.



Figure 7: *If cooking becomes easier, will we see more men in the kitchen?*

3.5 Case Study: Solar Sister

In Tanzania, ENERGIA, in partnership with Solar Sister under the *Woman's Economic Empowerment Program* recruits, trains, mentors and provides leadership skills in business for women (Figure 8). First, potential solar sister entrepreneurs are identified with the help of the local community leaders then they are supported with multi-stage entrepreneur training, continuous sisterhood of mentorship and market development. So far, they have impacted over 1.4 million people across Africa. These women bring high quality and affordable clean energy solutions to rural customers. Solar Sister also has a Gender and Energy Advocacy program called *Women + Energy = WE Shine*; a nation-wide campaign that raises the voice of women entrepreneurs in the energy value chain, providing inputs on strategies and success stories to support integration of the women into the Tanzania's SE4All country agenda (Energia 2019).

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Figure 8: Solar Sister entrepreneurs (Africa 2017).

Solar sister uses an Avon-style product distribution model as an innovative method of spreading solar technology. The Avon style business model works by recruiting a sales representative who is required to come with his or her social network, they are trained by an organization/company on certain products and can first use the products just to familiarise themselves with it. The sales reps are expected to invest their own capital to get the products and after training they can then sell these products to family members, friends as the circle expands to friends of friends and then the community at large. This style of business relies on the word of mouth from one person who has used the product to one that has not, or observing differences made to people's lives from using it which sparks interest in what they are using to look better, and in the case of solar sister, to make life better, affordable and clean. This business model capitalises on the fact that trust and familiarity of the sales rep to the consumers (family, friends and acquaintances) is more persuasive than conventional sales methods that rely on strangers selling to new customers (Brandon 2015).

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This business model allows Solar Sister to empower women to provide rural customers with products that they would otherwise not have had access to (Basu et al. 2013). The founder and CEO of Solar Sister, Lucey Katherine, saw solar products transform from expensive, heavy and bulky items with big panels, wires, batteries requiring substantial installations; to small, compact and more affordable integrated products, such as the solar lantern. People from rural areas could now access and afford them, especially to replace kerosene, which was expensive - around \$2 or \$4 weekly, versus a solar lantern with a \$5 upfront cost and free fuel (the sun) (Cynthia 2018).

This business model could work well for eCook, as the economic argument of diverting an existing expenditure (in this case charcoal for cooking instead of kerosene for lighting) is the same. Cooking is normally a topic of conversation amongst women, with most women in Tanzania learning to cook from their mothers and other female relatives and friends. As a result, selling new cooking technologies by commissioning women as sales agents targeting their friends, family and neighbours is a natural fit. Ongoing research on eCook in Zambia has revealed that several research participants regularly attend kitchen parties, where groups of (primarily) women get together at a group member's home to share recipes, techniques and new kitchen gadgets. It is clear to see how such gatherings could be extended/replicated to form the basis of an Avon-style business model for eCook products. (Hosier et al. 2017).

The reach of the Avon-style business model could be greatly extended using social media. Similar research in Kenya has uncovered a Facebook group ('Let's Cook Kenyan Meals') with 1.6 million members (Figure 9). Participants share recipes, pictures of their favourite dishes and discuss kitchen practices, which sometimes ventures into the realms of energy (e.g. asking which fuel produces the tastiest chapati or how long a 6kg gas cylinder lasts for). Posts regularly receive in excess of 1,000 comments and 5,000 likes, clearly showing the broad reach of the group. Some posts also have a commercial nature, offering cooking products/services, showing that it could be a platform for direct sales

IN FACT, THE AVON STYLE BUSINESS MODEL EMPLOYED BY SOLAR SISTER IS ALREADY EMPLOYED BY SEVERAL ACTORS TO MARKET IMPROVED BIOMASS & BIOFUEL COOKSTOVES (HOSIER ET AL. 2017).

THE ASPIRATIONAL NATURE OF ECOOK PRODUCTS/SERVICES IS LIKELY TO PROVIDE A STRONG DRIVER TO ATTRACT NEW USERS. BY WATCHING SOMEONE YOU ARE FAMILIAR WITH COOK THE DISHES YOU KNOW, ASKING THEM QUESTIONS & TRYING IT OUT YOURSELF IS LIKELY TO HELP MANY TO OVERCOME THE RESERVATIONS THEY MAY HAVE ABOUT THIS NEW TECHNOLOGY.

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of eCook products/services, recruiting new entrepreneurs and/or organising Avon-style kitchen parties in new areas.



Figure 9: Sample post from the Let's Cook Kenyan Meals Facebook group.

Similarly, YouTube videos posted by East African food bloggers showing a step by step recipe for typical foods often receive hundreds of thousands of views (Figure 10). If these bloggers could be recruited as sales agents, or simply to feature eCook products/services in one of their videos, this could open the door to hundreds of thousands of new potential users.



Figure 10: East African food blogger with 366,000 hits for her chapati recipe.

So far TaTEDO has received 40 inquiries for electric pressure cookers and rice cookers after they facilitated a two-day training program that supported the promotion of alternative cooking energy technologies (Figure 11). The main objective of the training was to introduce and encourage wider use of efficient electric appliances for household cooking services and small-scale businesses on its potential for financial, time and energy saving.

SUCCESSFULLY
LEVERAGING EXISTING
SOCIAL MEDIA
COMMUNITIES COULD
GREATLY EXPAND THE
SCALABILITY OF THE AVON
BUSINESS MODEL AS A
MARKETING STRATEGY
FOR ECOOK FIRSTLY, AS A
TOOL FOR RAISING
AWARENESS OF THE
PRODUCT/SERVICE,
SECONDLY, FOR
PUBLICISING IN PERSON
DEMONSTRATIONS &
THIRDLY FOR RECRUITING
NEW SALES AGENTS.

EAST AFRICA HAS AN
EMERGING FOOD BLOGGER
SCENE, FUELLED
PRIMARILY BY YOUNGER
PEOPLE WANTING TO
LEARN HOW TO COOK NEW
DISHES. TAPPING INTO
THIS PLATFORM COULD BE
ANOTHER ROUTE TO
RAPIDLY REACHING SCALE,
AS VIDEO RECIPES ON
YOUTUBE RECEIVE
HUNDREDS OF THOUSANDS
OF VIEWS.



Figure 11: Training event on energy-efficient electric cooking organised by TaTEDO, supported by WWF/SIDA (Philemon 2018).

As with any business model, this one also has challenges. Abby (2018) conducted interviews of former entrepreneurs to find out why some women dropped out of their solar sister business:

- *Start-up and scale-up capital:* some women having taken up a loan for their initial inventory down payment which has to be repaid within a short period of time do not have a chance to turn over their inventory month after month. Abby (2018) reports that their “data shows that entrepreneurs in [their] program who begun their business with a loan have lower sales and tend to drop out sooner.” For larger products, such as eCook systems, the core business model may have to be adapted, with the entrepreneurs aiming to sign up new customers to an ‘eCook service’, rather than the directly selling the product itself. For one, very few customers are likely to be able to purchase a system costing several hundreds of dollars in one go, but it is also unrealistic to expect entrepreneurs to purchase stock with their own money.
- *Competition:* especially from low quality and faulty products in the market, which undermines the importance of having strong brand and consumer awareness. In Dar es salaam, one of the participants

A KEY CHARACTERISTIC OF THE AVON-STYLE BUSINESS MODEL IS THAT ENTREPRENEURS FIRST INVEST THEIR OWN FUNDS TO PURCHASE PRODUCTS THAT THEY CAN SELL ON AT A PROFIT. WHILST THIS COULD WORK FOR EFFICIENT ELECTRIC COOKING APPLIANCES WITHOUT BATTERIES, THE BUSINESS MODEL WILL CLEARLY NEED TO BE ADAPTED FOR ECOOK SYSTEMS, WHICH ARE LIKELY TO COST SEVERAL HUNDREDS OF DOLLARS.

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of the eCook research noted this as a challenge that comes with the pressure cookers and rice cookers, especially because they do not come with spare parts. For example, the first thing that might get destroyed in a pressure cooker is the rubber that seals the pot to the lid. Once this is spoilt there is no other spare to replace it and a user will be forced to either buy another pressure cooker, (which would be too expensive and very wasteful), use it as an unpressurised pot/stove, turn to a cheaper knock-off product, or replace the seal with one from another model, which could be dangerous.

- *Health related issues:* such as chronic illnesses, pregnancies or even short-term sickness that could temporarily or permanently force an entrepreneur to stop her business ventures in their communities.
- *Cultural reasons:* of women entrepreneurs citing their husbands denying them the opportunity to do business due to deeply entrenched norm and culture.

ANOTHER ADVANTAGE OF THE AVON-STYLE BUSINESS MODEL IS THAT THE SALES AGENTS CAN ALSO OFFER MAINTENANCE SERVICES. NOT ONLY DOES THIS ADDRESS THE LOGISTICAL CHALLENGES IN OBTAINING SPECIALIST PARTS SUCH AS SEALING RINGS FOR PRESSURE COOKERS, BUT USERS ARE MUCH MORE LIKELY TO APPROACH SOMEONE FAMILIAR TO HELP SOLVE THEIR SMALL PROBLEMS BEFORE THEY BECOME MAJOR ISSUES.

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4 Conclusion

By casting a gendered lens onto the future market for eCook products and services in Tanzania, this study has uncovered new potential impacts, barriers and drivers for this emerging concept. In particular, the Avon-style business model employed by Solar Sister and several cookstove actors shows particular promise as a means to rapidly reach scale by leveraging existing social networks. If this can be achieved, time savings in the kitchen could lead new opportunities for cooking as a new or enhanced productive activity for women. Quicker and easier cooking may also lead to a shift in gender roles by encouraging men to cook more. However, key to achieving this will be overcoming the perception of pressure cookers as dangerous and electricity as too expensive for cooking.

The findings from this gender analysis will be combined with those from the other activities that have been carried under the eCook Tanzania Market Assessment. Together they will build a more complete picture of the opportunities and challenges that await this emerging concept. Further outputs will be available from <https://elstove.com/innovate-reports/>.

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6 Appendix

6.1 Appendix A: Problem statement and background to Innovate eCook project

6.1.1 Beyond business as usual

The use of biomass and solid fuels for cooking is the everyday experience of nearly 3 Billion people. This pervasive use of solid fuels—including wood, coal, straw, and dung—and traditional cookstoves results in high levels of household air pollution, extensive daily drudgery required to collect fuels, and serious health impacts. It is well known that open fires and primitive stoves are inefficient ways of converting energy into heat for cooking. The average amount of biomass cooking fuel used by a typical family can be as high as two tons per year. Indoor biomass cooking smoke also is associated with a number of diseases, including acute respiratory illnesses, cataracts, heart disease and even cancer. Women and children in particular are exposed to indoor cooking smoke in the form of small particulates up to 20 times higher than the maximum recommended levels of the World Health Organization. It is estimated that smoke from cooking fuels accounts for nearly 4 million premature deaths annually worldwide –more than the deaths from malaria and tuberculosis combined.

While there has been considerable investment in improving the use of energy for cooking, the emphasis so far has been on improving the energy conversion efficiency of biomass. Indeed in a recent overview of the state of the art in Improved Cookstoves (ICS), ESMAP & GACC (2015), World Bank (2014), note that the use of biomass for cooking is likely to continue to dominate through to 2030.

“Consider, for a moment, the simple act of cooking. Imagine if we could change the way nearly five hundred million families cook their food each day. It could slow climate change, drive gender equality, and reduce poverty. The health benefits would be enormous.” ESMAP & GACC (2015)

The main report goes on to say that “The “business-as-usual” scenario for the sector is encouraging but will fall far short of potential.” (ibid,) It notes that without major new interventions, over 180 million households globally will gain access to, at least, minimally improved¹ cooking solutions by the end of the

¹ A minimally improved stove does not significantly change the health impacts of kitchen emissions. “For biomass cooking, pending further evidence from the field, significant health benefits are possible only with the highest quality fan gasifier stoves; more moderate health impacts may be realized with natural draft gasifiers and vented intermediate ICS” (ibid)

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decade. However, they state that this business-as-usual scenario will still leave over one-half (57%) of the developing world's population without access to clean cooking in 2020, and 38% without even minimally improved cooking solutions. The report also states that 'cleaner' stoves are barely affecting the health issues, and that only those with forced gasification make a significant improvement to health. Against this backdrop, there is a need for a different approach aimed at accelerating the uptake of truly 'clean' cooking.

Even though improved cooking solutions are expected to reach an increasing proportion of the poor, the absolute numbers of people without access to even 'cleaner' energy, let alone 'clean' energy, will increase due to population growth. The new Sustainable Development Goal 7 calls for the world to "ensure access to affordable, reliable, sustainable and modern energy for all". Modern energy (electricity or LPG) would indeed be 'clean' energy for cooking, with virtually no kitchen emissions (other than those from the pot). However, in the past, modern energy has tended to mean access to electricity (mainly light) and cooking was often left off the agenda for sustainable energy for all.

Even in relation to electricity access, key papers emphasise the need for a step change in investment finance, a change from 'business as usual'. IEG World Bank Group (2015) note that 22 countries in the Africa Region have less than 25 percent access, and of those, 7 have less than 10 percent access. Their tone is pessimistic in line with much of the recent literature on access to modern energy, albeit in contrast to the stated SDG7. They discuss how population growth is likely to outstrip new supplies and they argue that "unless there is a big break from recent trends the population without electricity access in Sub-Saharan Africa is projected to increase by 58 percent, from 591 million in 2010 to 935 million in 2030." They lament that about 40% of Sub-Saharan Africa's population is under 14 years old and conclude that if the current level of investment in access continues, yet another generation of children will be denied the benefits of modern service delivery facilitated by the provision of electricity (IEG World Bank Group 2015).

"Achieving universal access within 15 years for the low-access countries (those with under 50 percent coverage) requires a quantum leap from their present pace of 1.6 million connections per year to 14.6 million per year until 2030." (ibid)

Once again, the language is a call for a something other than business as usual. The World Bank conceives of this as a step change in investment. It estimates that the investment needed to really address global electricity access targets would be about \$37 billion per year, including erasing generation deficits and additional electrical infrastructure to meet demand from economic growth. "By comparison, in recent

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years, low-access countries received an average of \$3.6 billion per year for their electricity sectors from public and private sources” (ibid). The document calls for the Bank Group’s energy practice to adopt a new and transformative strategy to help country clients orchestrate a national, sustained, sector-level engagement for universal access.

In the following paragraphs, we explore how increasing access to electricity could include the use of solar electric cooking systems, meeting the needs of both supplying electricity and clean cooking to a number of households in developing countries with sufficient income.

6.1.2 Building on previous research

Gamos first noted the trends in PV and battery prices in May 2013. We asked ourselves the question, is it now cost effective to cook with solar photovoltaics? The answer in 2013 was ‘no’, but the trends suggested that by 2020 the answer would be yes. We published a concept note and started to present the idea to industry and government. Considerable interest was shown but uncertainty about the cost model held back significant support. Gamos has since used its own funds to undertake many of the activities, as well as IP protection (a defensive patent application has been made for the battery/cooker combination) with the intention is to make all learning and technology developed in this project open access, and awareness raising amongst the electrification and clean cooking communities (e.g. creation of the infographic shown in Figure 12 to communicate the concept quickly to busy research and policy actors).

Gamos has made a number of strategic alliances, in particular with the University of Surrey (the Centre for Environmental Strategy) and Loughborough University Department of Geography and seat of the Low Carbon Energy for Development Network). In October 2015, DFID commissioned these actors to explore assumptions surrounding solar electric cooking² (Batchelor 2015b; Brown & Sumanik-Leary 2015; Leach & Oduro 2015; Slade 2015). The commission arose from discussions between consortium members, DFID, and a number of other entities with an interest in technological options for cleaner cooking e.g. Shell Foundation and the Global Alliance for Clean Cookstoves.

Drawing on evidence from the literature, the papers show that the concept is technically feasible and could increase household access to a clean and reliable modern source of energy. Using a bespoke economic model, the Leach and Oduro paper also confirm that by 2020 a solar based cooking system

² The project has been commissioned through the PEAKS framework agreement held by DAI Europe Ltd.

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could be comparable in terms of monthly repayments to the most common alternative fuels, charcoal and LPG. Drawing on published and grey literatures, many variables were considered (e.g. cooking energy needs, technology performance, component costs). There is uncertainty in many of the parameter values, including in the assumptions about future cost reductions for PV and batteries, but the cost ranges for the solar system and for the alternatives overlap considerably. The model includes both a conservative 5% discount rate representing government and donor involvement, and a 25% discount rate representing a private sector led initiative with a viable return. In both cases, the solar system shows cost effectiveness in 2020.

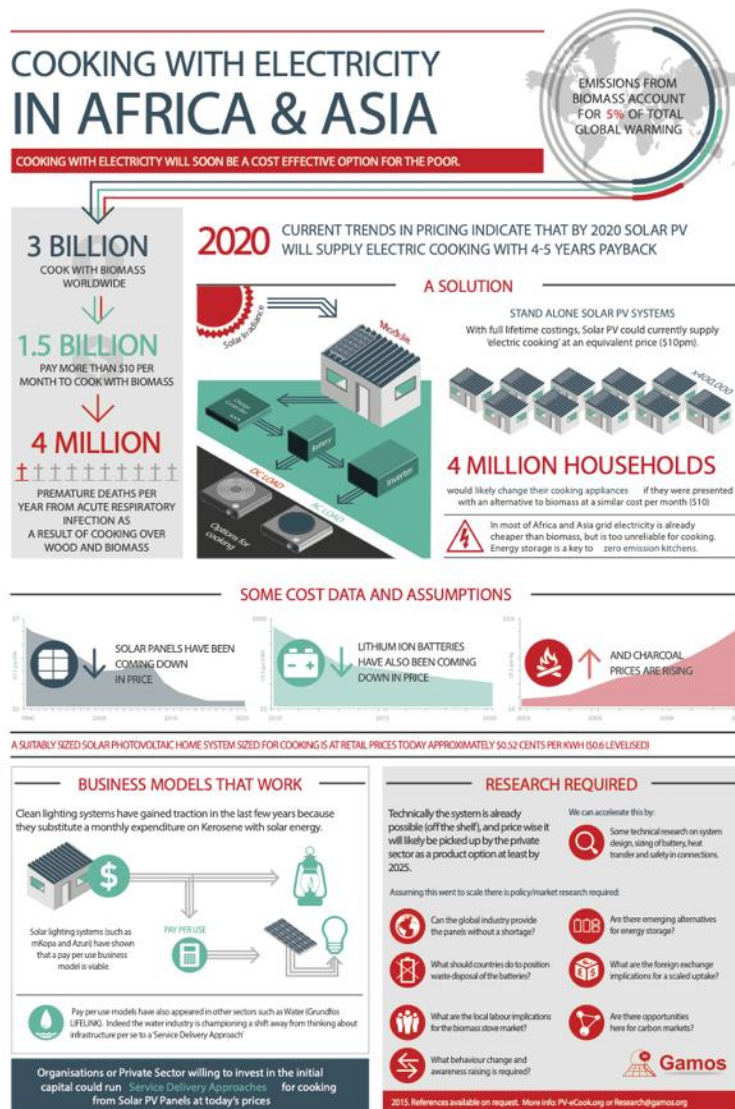


Figure 12 Infographic summarising the concept in order to lobby research and policy actors.

The Brown and Sumanik-Leary paper in the series examines the lessons learned from four transitions – the uptake of electric cooking in South Africa, the roll out of Improved Cookstoves (ICS), the use of LPG and the uptake of Solar Home Systems (SHS). They present many behavioural concerns, none of which preclude the proposition as such, but all of which suggest that any action to create a scaled use of solar electric cooking would need in depth market analysis; products that are modular and paired with locally appropriate appliances; the creation of new, or upgrading of existing, service networks; consumer awareness raising; and room for participatory development of the products and associated equipment.

A synthesis paper summarising the above concludes by emphasising that the proposition is not a single product – it is a new genre of action and is potentially transformative. Whether solar energy is utilised within household systems or as part of a mini, micro or nano grid, linking descending solar PV and battery costs with the role of cooking in African households (and the Global South more broadly) creates a significant potential contribution to SDG7. Cooking is a major expenditure of 500 million households. It is a major consumer of time and health. Where households pay for their fuelwood and charcoal (approximately 300 Million) this is a significant cash expense. Solar electric cooking holds the potential to turn this (fuelwood and charcoal) cash into investment in modern energy. This “consumer expenditure” is of an order of magnitude more than current investment in modern energy in Africa and to harness it might fulfil the calls for a step change in investment in electrical infrastructure.

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6.1.3 Summary of related projects

A series of inter-related projects have led to and will follow on from the research presented in this report:

- **Gamos Ltd.**'s early conceptual work on eCook (Batchelor 2013).
 - The key **CONCEPT NOTE** can be found here.
 - An **early infographic** and a **2018 infographic** can be found here.
- Initial technical, economic and behavioural feasibility studies on eCook commissioned by **DfID (UK Aid)** through the **CEIL-PEAKS Evidence on Demand** service and implemented by **Gamos Ltd., Loughborough University** and **University of Surrey**.
 - The key **FINAL REPORTS** can be found here.
- Conceptual development, stakeholder engagement & prototyping in Kenya & Bangladesh during the "**Low cost energy-efficient products for the bottom of the pyramid**" project from the **USES** programme funded by **DfID (UK Aid), EPSRC** & DECC (now part of **BEIS**) & implemented by **University of Sussex, Gamos Ltd., ACTS (Kenya), ITT & UIU (Bangladesh)**.
 - The key **PRELIMINARY RESULTS** (Q1 2019) can be found here.
- A series of global & local market assessments in Myanmar, Zambia and Tanzania under the "**eCook - a transformational household solar battery-electric cooker for poverty alleviation**" project funded by **DfID (UK Aid)** & **Gamos Ltd.** through **Innovate UK's Energy Catalyst** Round 4, implemented by **Loughborough University, University of Surrey, Gamos Ltd., REAM (Myanmar), CEEEZ (Zambia) & TaTEDO (Tanzania)**.
 - The key **PRELIMINARY RESULTS** (Q1 2019) can be found here.
- At time of publication (Q1 2019), a new **DfID (UK Aid)** funded research programme '**Modern Energy Cooking Services**' (MECS) lead by **Prof. Ed Brown** at **Loughborough University** is just beginning and will take forward these ideas & collaborations.



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6.2 Appendix 2: About the Modern Energy Cooking Services (MECS) Programme.

Sparking a cooking revolution: catalysing Africa's transition to clean electric/gas cooking.

www.mecs.org.uk | mecs@lboro.ac.uk

Modern Energy Cooking Services (MECS) is a five-year research and innovation programme funded by UK Aid (DFID). MECS hopes to leverage investment in renewable energies (both grid and off-grid) to address the clean cooking challenge by integrating modern energy cooking services into the planning for access to affordable, reliable and sustainable electricity.

Existing strategies are struggling to solve the problem of unsustainable, unhealthy but enduring cooking practices which place a particular burden on women. After decades of investments in improving biomass cooking, focused largely on increasing the efficiency of biomass use in domestic stoves, the technologies developed are said to have had limited impact on development outcomes. The Modern Energy Cooking Services (MECS) programme aims to break out of this “business-as-usual” cycle by investigating how to rapidly accelerate a transition from biomass to genuinely ‘clean’ cooking (i.e. with electricity or gas).

Worldwide, nearly three billion people rely on traditional solid fuels (such as wood or coal) and technologies for cooking and heating³. This has severe implications for health, gender relations, economic livelihoods, environmental quality and global and local climates. According to the World Health Organization (WHO), household air pollution from cooking with traditional solid fuels causes to 3.8 million premature deaths every year – more than HIV, malaria and tuberculosis combined⁴. Women and children are disproportionately affected by health impacts, and bear much of the burden of collecting firewood or other traditional fuels.

Greenhouse gas emissions from non-renewable wood fuels alone total a gigaton of CO₂e per year (1.9-2.3% of global emissions)⁵. The short-lived climate pollutant black carbon, which results from incomplete combustion, is estimated to contribute the equivalent of 25 to 50 percent of carbon dioxide warming

³ http://www.who.int/indoorair/health_impacts/he_database/en/

⁴ <https://www.who.int/en/news-room/fact-sheets/detail/household-air-pollution-and-health>
https://www.who.int/gho/hiv/epidemic_status/deaths_text/en/, <https://www.who.int/en/news-room/fact-sheets/detail/malaria>, <https://www.who.int/en/news-room/fact-sheets/detail/tuberculosis>

⁵ Nature Climate Change 5, 266–272 (2015) doi:10.1038/nclimate2491

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globally – residential solid fuel burning accounts for up to 25 percent of global black carbon emissions⁶. Up to 34% of woodfuel harvested is unsustainable, contributing to climate change and local forest degradation. In addition, approximately 275 million people live in woodfuel depletion ‘hotspots’ – concentrated in South Asia and East Africa – where most demand is unsustainable⁷.

Africa’s cities are growing – another Nigeria will be added to the continent’s total urban population by 2025⁸ which is set to double in size over the next 25 years, reaching 1 billion people by 2040. Within urban and peri-urban locations, much of Sub Saharan Africa continues to use purchased traditional biomass and kerosene for their cooking. Liquid Petroleum Gas (LPG) has achieved some penetration within urban conurbations, however, the supply chain is often weak resulting in strategies of fuel stacking with traditional fuels. Even where electricity is used for lighting and other amenities, it is rarely used for cooking (with the exception of South Africa). The same is true for parts of Asia and Latin America. Global commitments to rapidly increasing access to reliable and quality modern energy need to much more explicitly include cooking services or else household and localized pollution will continue to significantly erode the well-being of communities.

Where traditional biomass fuels are used, either collected in rural areas or purchased in peri urban and urban conurbations, they are a significant economic burden on households either in the form of time or expenditure. The McKinsey Global Institute outlines that much of women’s unpaid work hours are spent on fuel collection and cooking⁹. The report shows that if the global gender gap embodied in such activities were to be closed, as much as \$28 trillion, or 26 percent, could be added to the global annual GDP in 2025. Access to modern energy services for cooking could redress some of this imbalance by releasing women’s time into the labour market.

⁶ <http://cleancookstoves.org/impact-areas/environment/>

⁷ Nature Climate Change 5, 266–272 (2015) doi:10.1038/nclimate2491

⁸ <https://openknowledge.worldbank.org/handle/10986/25896>

⁹ McKinsey Global Institute. *The Power of Parity: How Advancing Women’s Equality can add \$12 Trillion to Global Growth*; McKinsey Global Institute: New York, NY, USA, 2015.

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To address this global issue and increase access to clean cooking services on a large scale, investment needs are estimated to be at least US\$4.4 billion annually¹⁰. Despite some improvements in recent years, this cross-cutting sector continues to struggle to reach scale and remains the least likely SE4All target to be achieved by 2030¹¹, hindering the achievement of the UN's Sustainable Development Goal (SDG) 7 on access to affordable, reliable, sustainable and modern energy for all.

Against this backdrop, MECS draws on the UK's world-leading universities and innovators with the aim of sparking a revolution in this sector. A key driver is the cost trajectories that show that cooking with (clean, renewable) electricity has the potential to reach a price point of affordability with associated reliability and sustainability within a few years, which will open completely new possibilities and markets. Beyond the technologies, by engaging with the World Bank (ESMAP), MECS will also identify and generate evidence on other drivers for transition including understanding and optimisation of multi-fuel use (fuel stacking); cooking demand and behaviour change; and establishing the evidence base to support policy enabling environments that can underpin a pathway to scale and support well understood markets and enterprises.

The five year programme combines creating a stronger evidence base for transitions to modern energy cooking services in DFID priority countries with socio-economic technological innovations that will drive the transition forward. It is managed as an integrated whole, however the programme is contracted via two complementary workstream arrangements as follows:

- An Accountable Grant with Loughborough University (LU) as leader of the UK University Partnership.
- An amendment to the existing Administrative Arrangement underlying DFID's contribution to the ESMAP Trust Fund managed by the World Bank.

The intended outcome of MECS is a market-ready range of innovations (technology and business models) which lead to improved choice of affordable and reliable modern energy cooking services for consumers. Figure 13 shows how the key components of the programme fit together. We will seek to have the MECS

¹⁰ The SE4ALL Global Tracking Report shows that the investment needed for universal access to modern cooking (not including heating) by 2030 is about \$4.4 billion annually. In 2012 investment was in cooking was just \$0.1 billion. Progress toward Sustainable Energy: Global Tracking Report 2015, World Bank.

¹¹ The 2017 SE4All Global Tracking Framework Report laments that, "Relative to electricity, only a small handful of countries are showing encouraging progress on access to clean cooking, most notably Indonesia, as well as Peru and Vietnam."

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principles adopted in the SDG 7.1 global tracking framework and hope that participating countries will incorporate modern energy cooking services in energy policies and planning.

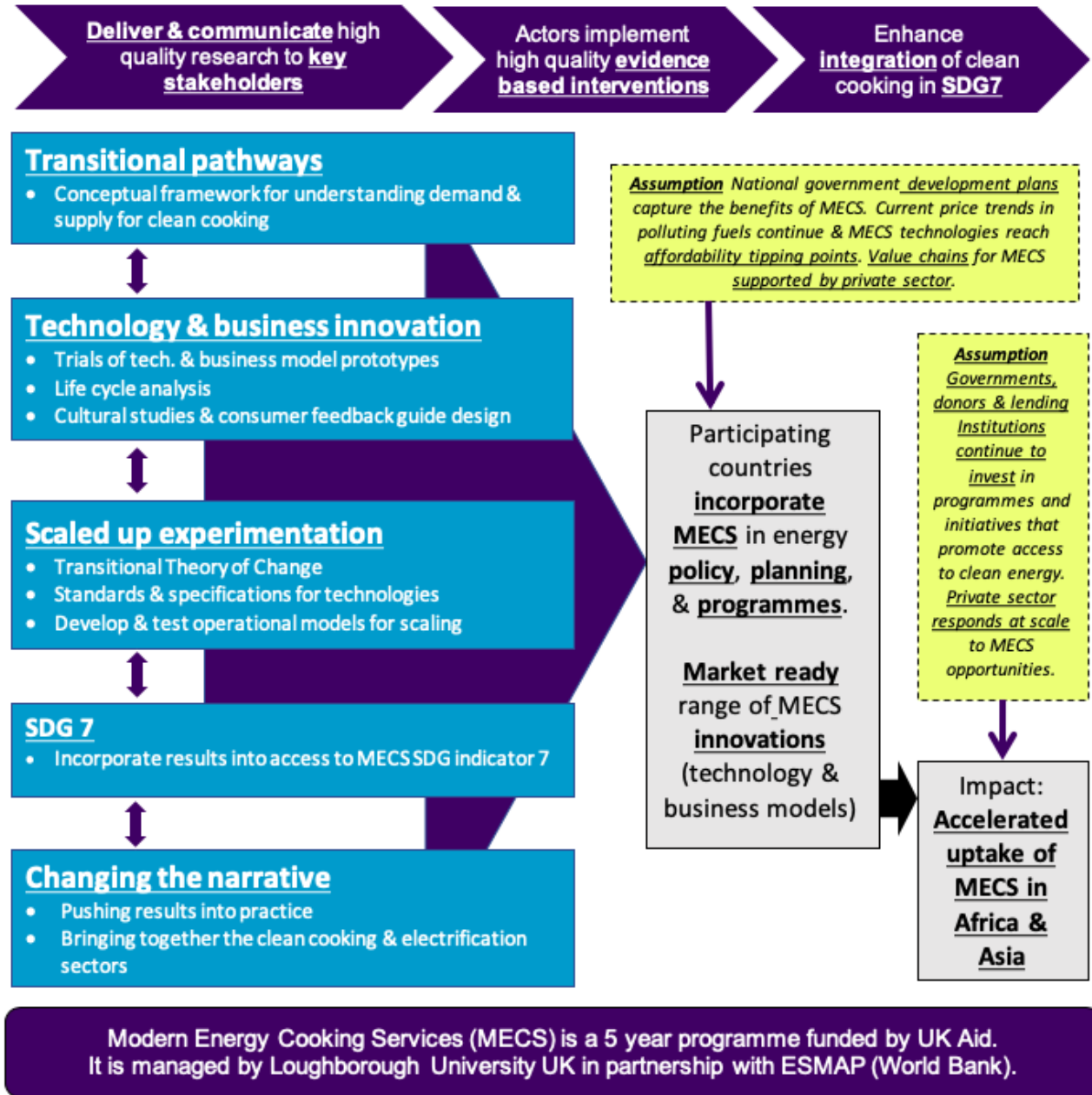


Figure 13: Overview of the MECS programme.