



Cooking Support on Mini-Grids Competition (COSMO)

Grant Specification Document



Competition overview

The Modern Energy Cooking Services (MECS) challenge fund provides research funding to stimulate innovations in modern energy cooking technology and systems. In addition, MECS supports the advancement of innovative cooking energy products, processes, and services in low-income countries that are appropriate and acceptable to users. This new competition enables the MECS programme, funded by the Foreign and Commonwealth Development Office (FCDO) and delivered by Loughborough University, to address key barriers to electric cooking uptake on mini-grids.

The Cooking Support on Mini-Grids (COSMO) competition is the latest in a series of challenge fund competitions that the MECS programme has engaged with. These have prompted innovation, early research, and piloting. All of which seek to rapidly accelerate the transition from biomass to clean cooking, particularly modern energy cooking services, on a global scale.

Launching in September 2022, the COSMO Challenge Fund competition builds on this progression of interest and seeks to explicitly strengthen the utilization of mini-grids (MG) for ecooking. We are looking to fund projects with mini-grid developers (and their partners) to enable electric cooking appliances to be sustainably used in homes or businesses.

Our research to date suggests that minigrids that plan to include ecooking from the start hold better potential for the inclusion of ecooking as part of a profitable business case (as opposed to when ecooking is retrofitted to an existing minigrid). However, adaptation and retrofitting of an existing grid will be considered if the business case developed during Phase 1 is strong enough.

Electric pressure cookers (EPCs) are the 'front running candidate' for the inclusion of ecooking in a minigrid, with rice and slow cookers a close second. Whilst these devices are preferred, we will consider any energy efficient electric cooking device if a strong case is made for it in the application.

Competition design

The fund will be run in two phases. Progression from phase 1 to phase 2 will be competitive rather than automatic. The selection for phase 2 will depend on the quality and suitability of the business case and modelling developed under phase 1.

- **Phase One:** will support up to 10 projects to undertake the design and modelling of the mini-grid project to include ecooking. It should focus on the business case and associated modelling for developing mini-grids for electric cooking. It should present the case for the financial sustainability of the minigrid, including a review of load demand and the provision of a load management system which includes ecooking. The model and report of phase one will be a gateway for further funding under phase 2.
- **Phase Two** will be used to deliver the system, inclusive of the cooking load, and include the collection and collation of data on the performance of the minigrid. This should include the impact of ecooking on the minigrid and a sample of user households within the community. It is anticipated that up to four projects will be funded under phase 2.

Eligible organisations

This challenge is open to developers of minigrids who are about to implement or adapt a grid (within the timeframe of the COSMO challenge fund).

We will also accept applications from existing grid operators who are seeking to manage household or institutional demand for electricity better or who are seeking to expand their existing grid.

Collaborations between different partners are welcome, especially in terms of interlinking local, rural communities with minigrid developers, but there must be one lead organisation identified.

The funding is not intended to cover the costs of building a mini-grid. It is just intended to cover the additional costs of adding ecooking to the grid.

Consortiums of organisations are eligible but there must be one lead organisation identified.

The research must take place in one of the eligible countries listed here;

Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Cameroon, Congo (Democratic Republic of the), Côte d'Ivoire, Ethiopia, Gambia, Ghana, Haiti, India, Indonesia, Kenya, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Morocco, Mozambique, Myanmar, Nepal, Niger, Nigeria, Pakistan, Papua New Guinea, Rwanda, Senegal, Sierra Leone, Solomon Islands, Somalia, South Sudan, Sudan, Swaziland, Tajikistan, Tanzania (United Republic of), Togo, Tunisia, Uganda, Vietnam, Zambia and Zimbabwe.

Limitations

- Organisations can only be named on one application as either the lead or as a consortium member. A consortium member is defined as an organisation who is actively involved in the implementation of activities. If an organisation is listed as either the lead or as a consortium member on more than one application, then all of them will be rejected. Only suppliers of devices and suppliers of specialist research capability can provide their services to multiple projects and be named in multiple applications.
- Applications suggesting working in more than one country will be rejected.
- Any application must utilise predominantly renewable energy. Hybrid systems must show that cooking is not based on the fossil fuel element of electricity production.

Phase 1 application

Organisations which are successful in being awarded phase 1 funding will spend 5 months collecting additional data and evidence to develop the details for the business plan, detailed modelling of the minigrid, and a high-level implementation plan for either building a new grid or modifying an existing one.

The application for phase 1 should focus on demonstrating an understanding of what a sustainable minigrid with an ecooking load could look like in the chosen context. It should provide an overview of the groundwork already completed and the existing knowledge. If some of the necessary data already exists, this should be identified and stated in the application with details of how it can be incorporated into the new data that will need to be collected. It should identify what data/knowledge gaps need to be filled during phase 1 and provide a plan for how that data will be collected (e.g. methods and approaches) and analysed within the 5 months available. There are different skills needed for data collection, consolidation, and analysis as well as the detailed modelling for the mini-grid. The application should demonstrate that there is a team capable of completing all the required tasks within the 5 months available. Further details are available in the Application Guidance Document.

Phase 1: Business plan and modelling cooking use on mini-grids explained in detail

The business plan (once finished during phase 1) **should show the business case with and without ecooking.**

Low consumer demand is said to create low profitability for minigrids. We acknowledge that this is not true for all circumstances, but one solution to low demand is to introduce a productive use anchor load. Ecooking provides two opportunities to increase demand. One is through higher domestic loads from a portion of households when they ecook and the second is productive use loads from small businesses using ecook to produce food or to pre-process food for longer life for storage and transport. The choice of productive use is not limited to cooking, irrigation schemes, working with craft co-operatives could be included for example.

We note that small ecook businesses may operate during the day and there may be a natural match in demand with solar PV based generation of supply. With low demand, minigrids often set their tariffs high (relative to the national grid) to ensure an overall system wide income level. A recent paper by Scott et al used field data in Tanzania to show that even at \$1 per kWh there were some meals that were cheaper to cook on an EPC than by charcoal or LPG.

We note that some developers have discussed with the programme that if the community consumed more energy overall, tariffs could be reduced yet yield the same overall income for the developer. Your business case should model whether this will/could be the case. You should also note whether the regulatory environment will allow you to do this (under point 7).

The business plan (once finished during phase 1) will need to address all the following areas.

1. **An analysis of current household expenditure on cooking** - this could include whether a particular segment of the community are more likely to adopt ecooking, and how this may affect their household finances. We note that the substitution of alternative paid for fuels by energy efficient electric appliances is generally a cost saving to households. However, we acknowledge that some minigrids are installed in places where communities collect their fuel or pay relatively low prices. A clear analysis of the fuel purchasing and gathering behaviour among market segments should be made, supplemented by interviews or focus groups with

householders to gauge the willingness to pay. This should result in an analysis of potential financial impact at household level for each market segment with clear reference to the assumptions made. The financial model (point 3) should address key barriers to the uptake of ecooking on minigrids as well as end-user demand (incl. how to address potential income volatility in agricultural communities)

2. **An analysis of current business expenditure on cooking** - an explanation of whether the ecooking is for local consumption or for sale outside the community should be included. The load modelling (point 9) will need to include the with and without scenarios and make clear whether the businesses are currently in operation and have existing expenditure on other fuels, or whether they are planned businesses that would need to start up.
3. **Detailed financial model** for the minigrid development and operation. The model must show the breakeven point and future profitability under different financial scenarios (e.g. a change in tariff). It must include normal income and expenditure, including the CAPEX, OPEX and relate the OPEX to the operating context and current and anticipated household and small business (productive use) expenditure.
4. **Technical performance model** showing the role and added value of ecooking.
5. **Detailed high-level design for the minigrid with a load management plan** of how the new or adapted minigrid will operate.
6. **Explanation of how the minigrid will operate within its environment** - especially in relation to affordability, operational sustainability of the minigrid (especially OPEX), local acceptance, socioeconomic challenges and opportunities, and cooking culture.
7. **Explanation of how the minigrid will operate with the national regulatory environment** – a review of national standards, guidelines or regulations and tariffs and how these could influence or impact on the operational sustainability.
8. **Pathway to operation** - a commentary on if the data shows whether the minigrid with ecooking is a bankable proposal for investors. If investors can be identified and/or approached the business plan should include evidence of this. What regulatory approvals or due diligence needs to be in place to receive funding/credit/investment – can this be achieved. What services will be provided to minimize downtime. What is the project plan for procurement, recruitment, assessment of household wiring/provision of upgrades etc, including anticipated timescales to get the minigrid built and operational. In addition, the business plan will need to explain how the mini-grid can adapt to evolving circumstances, for example, repurposing the resources and assets utilised in an unsuccessful mini-grid and/or a minigrid where changing circumstances overtake its use (e.g. national grid expansion).

9. **Modelling on the effect of including ecooking loads-** including explicitly stated assumptions about the use of all customer appliances, time of day use, peak demand, diversification factors, etc.
10. **Tariff structure** – An explanation on how the tariff structure has been developed. If different tariffs or time of day incentives are to be used this should be clearly stated. Often there are regulations regarding the setting of tariffs and these constraints should be explicitly stated for the context where the minigrid is or will be.
11. **Demand management plan** – an explanation on how loads across the mini grid will be managed. What plans will be in place to mitigate peaks in network demand that could be caused, for example, by synchronised use of cooking devices.
12. **Energy efficient appliances** – a review of the potential energy efficient appliances that could be offered to mini grid users. Any appliance suggested must fit into the market space and should be durable and repairable.
13. **Existing opportunities to mitigate the upfront costs for users:** schemes mitigating the upfront costs of appliances are likely to be important. There will be market segments where households are willing to pay for the appliances from their savings and/or their existing credit mechanisms (e.g., a bank or credit card). However, we anticipate that there may be a need to arrange credit facilities for the users – a User/Consumer Finance plan. Credit facilities may come from a number of sources and can be offered on different terms (fixed term, a form of lease hire or as a pay as you go). We note that many countries have Savings and Credit cooperative organisations (SACCO), and it may be appropriate to make the local SACCOS aware that the energy efficient appliances can save the household money and help repay the loan.

We are increasingly seeing the possibilities of the voluntary carbon market and of Results Based Funding (RBF). The voluntary carbon market is considering verification of the use of appliances through metering the electrical supply, and this may be something you may want to consider.

RBF can be accessed through several agencies who are aware that higher tier stoves, in general, improve health by reducing household air pollution, release time from the processes of fuel purchase and collection, reduce deforestation (as well as reduce carbon emissions), and offer gender co-benefits. We note that the World Bank Clean Cooking Fund (CCF) and NEFCO use RBF for its co-benefits, and Endev have also applied RBF schemes.

This challenge fund can be used in conjunction with an application for RBF or carbon finance to enhance it, however we offer a note of caution that some schemes take considerable time (and investment in processes) to access, and the applicant should be confident and provide some evidence that the RBF/Carbon scheme can be accessed within the lifetime of the challenge fund if it is key to the detailed sustainable supply chain activation plan.

Applications for phase 1 should provide a brief overview of the financing options available within the selected country and then justify the selection of the chosen approach as part of the business plan development during phase 1.

If the long term sustainability of the mini-grid is likely to include RBF and/or Carbon credit schemes the application for phase 1 should include a brief comment on what action you might take during the project timeline to initiate the use of such schemes in the longer term.

14. **Household wiring assessment:** how will the safety and suitability of household wiring be assessed, can upgrades be provided if necessary? (If so, what is the approach?)
15. **Sustainability and consumer satisfaction** – For the appliances recommended, how will repairs happen, will there be a warranty offered and how will that be honoured. How do these provisions fit into strengthening the longer-term capacity within the market to ensure consumers get maximum benefit from their investment? How will users be supported to use and look after their appliance/s?
16. **A sales and awareness campaign***: what messages are being/ will be used to promote the products, why? How is the awareness campaign constructed? We note that demonstrations seem to be very effective in attracting interest, both live demonstrations and social media videos. You may wish to leverage local media – billboards, radio and TV advertising and there may also be opportunities at community gatherings. A general plan should be a part of the proposal.
17. **After sales services***: immediate after sales services should be provided. Sometimes the use of an energy efficient electrical appliance requires some adaptation in cooking processes. There should be support made available for learning how best to use the appliance (and prevent early frustrations of bad tasting food). How will this be achieved/implemented?
18. **eWaste management** - many products globally are increasingly designed for a throw away culture and eWaste at the end of the device life may become a problem. What might happen when the appliance reaches end of life (this will likely involve engagement with other stakeholders over a longer-time period but initial suggestions on a suitable process should be made).

The deliverable for phase 1 will be the business plan (covering all points 1-18), detailed modelling and the rationale behind all assumptions, and a high-level implementation plan for either building a new grid or modifying an existing one.

Phase 2: Delivering a mini-grid system inclusive of ecooking and a research and data gathering plan – an overview

This section provides an overview of the expectations for phase 2, it is provided for information only. **The current application should focus on phase 1, it is not expected to address phase 2 in detail at this stage.**

Applicants who demonstrate that there is a viable case for the inclusion of ecooking on their minigrid during phase 1 will be eligible to apply for phase 2. However, as phase 2 is a competitive process, successfully completing phase 1 will not result in an automatic progression to phase 2. Phase 2 will offer a grant of up to £150,000 to implement the business plan and modelling on the selected minigrid. The funding is intended to mitigate the risk for the developer of the inclusion of ecooking into a minigrid, it is not intended to fund the full cost of building the minigrid. The minigrid should have an implementation timeline consistent with the challenge fund timeline.

In Phase 2 the reporting deliverables should focus on the realities of delivering the plan developed during phase 1. There will be an obligation to share learnings and findings from the implementation of Phase 2, including collection of feedback of their experience from a sample of consumers over the lifetime of the challenge fund, and an analysis data metered at a household or appliance level, as well as the minigrid system performance and financial records.

Research and data gathering plan

The research activities outlined in this section need to be included during the implementation phase of the competition (Phase 2). That means that during phase 1, the research activities need to be planned alongside the development of the **business plan**.

- **A plan to monitor a minimum of 10% of users with energy meters.** The type of meter, supplier, data resolution, data storage method, and what will be monitored should be specified¹. If the appliances have built in metering capability this would enhance the application, but there is also the option to bring in third party meters which would gather use data. Research suggests that households like a visible meter, particularly in the early days of use, so they can see how much the electricity is costing them. Energy-use is the most obvious form of monitoring, allowing various analyses and serving as a proxy for device use. However, other forms of device use-monitoring could be proposed. (Details of the monitoring are not needed for current application).
- **A plan for gathering qualitative feedback from a minimum of 10% of users.** Getting feedback from users is vital to the project. Qualitative feedback should focus on experiences of acquisition, use and repair. (e.g. a follow up survey within one month of acquisition, and after 6 months). Additional, more detailed follow up should be conducted with a minimum of 50 users. This

¹ In previous challenge funds we have asked for a process called cooking diaries, which engages the user to document what foods they are cooking. We do not see this approach as part of this project. We assume a sample of users will be given energy meters which will record and store data automatically on device use (resolution at the minute level).

should focus on users known to have got on well with and/or have had problems with the appliance(s), it could cover successful and unsuccessful recipes; whether expenditure on cooking fuels changed; perceived benefits; how did they learn to use it; how often do they use it; etc. The proposal should outline how users will be contacted (method), how and when the responses will be collected, how the data will be safely and appropriately stored, the key themes to be covered in the feedback. (A full draft of the specific questions to be asked is not needed for the application).

- **A plan to assess the suitability of the user/consumer finance plan (including links to results based financing or carbon credits).** The research should document the partnerships and the associated financial conditions attached to any credit line. A sample of experiences from a minimum of 10% of users who used any mechanism set out in the user/consumer finance plan should be documented. The proposal should outline how users will be contacted (method), how and when the responses will be collected, how the data will be safely and appropriately stored, the key themes to be covered in the feedback. (A full draft of the specific questions to be asked is not needed for the application).

The deliverable for phase 2 will be a report on the implementation of the mini-grid, supported with an analysis of the learning generated through the implementation with specific references to the user experience data collected. It will include an analysis on the financials and overall sustainability of the system.

The regular reporting will cover experiences on the supply chain, what is working, what is not working, possibilities for adaptation and adjustments. This will be summarised in a final report to document the learnings for how to effectively create a sustainable supply chain with appropriate demand stimulation.

Competition Implementation

Date	Activity
September 1 st 2022	Pre- launch of Cooking Support on Mini grids (COSMO) competition
September 14 th 2022	COSMO opens for applications
1pm BST September 16 th 2022	COSMO webinar – overview of the completion and opportunity for Q&A
November 9 th 2022	COSMO closes for applications
November 2022	Application review and shortlisting Completion of due diligence by shortlisted organisations
December 2022	Final selection and confirmation of award Contracting
January 2023	All projects begin for up to 29 months total (ending no later than June 2025)

Reporting requirements and payment schedules

All successful organisations will be provided with the relevant reporting templates. MECS receives public funding from FCDO and therefore, all information and data collected through the programme is published into the public domain. Commercially sensitive data is excluded from this requirement but the decision on what is deemed 'commercially sensitive' will be taken in conjunction with the MECS senior management team.

After an initial upfront payment on contract signing, all subsequent payments will only be made on the successful completion of pre-defined deliverables. Progression between the phases (i.e. phase 1 to 2) will be competitive and dependent on the overall success of the previous phase and the total amount of budget available. The time and budget allocated for each phase is;

- Phase 1 (5 months) – Business plan and modelling cooking use on mini-grids – up to £50,000
- Phase 2 (up to 24 months) – Implementation – up to £150,000

Phase	Payment schedule
1	<ul style="list-style-type: none">• Contract signing – 50%• Delivery of business model, detailed modelling and the rationale behind all assumptions, and a high-level implementation plan for either building a new grid or modifying an existing one – 50%
2	<ul style="list-style-type: none">• Start of implementation – 40%• Feedback and data users after first month of use - 15%• Feedback and data from users after six month of use and an assessment of the consumer finance mechanisms - 15%• Final report detailing learning from implementation – 30%