



## Request for Proposals: Market Opportunity for Brushless DC Motors in Off- and Weak-grid Appliances

### Introduction

The Low Energy Inclusive Appliances programme (LEIA) aims to accelerate the availability, affordability, efficiency and performance of a range of low energy inclusive appliances particularly suited to lesser developed countries. LEIA supports market, consumer, impacts, and technology research that further the programme's goal to double the efficiency and halve the costs of a suite of off- and weak-grid technologies.

Brushless direct current (BLDC) motors are an area of interest in terms of the total potential demand for motor-driven appliances in off- and weak-grid applications, and the energy efficiency, performance, and reliability improvements that BLDC motors may offer over competing motor technologies.

### Objective

This research project is intended to:

1. Characterize the current and future global market for BLDC motors up to 10 HP (7.5 kW).
2. Evaluate and segment the potential addressable market for BLDC motors in off- and weak-grid applications, including domestic appliances, cold chain, water pumping, agricultural processing, sewing machines, power tools, electric scooters and motorcycles, among others.
3. Quantify the benefits of BLDC motors versus competing technologies in off- and weak-grid applications, in terms of enhanced efficiency, performance, and reliability, and other factors
4. Identify barriers to market transformation for identified BLDC motor market segments, and strategies to accelerate adoption of BLDC motors in off- and weak-grid applications at scale.

The results of this research will be an important component of the evidence base for future Efficiency for Access Coalition activities to support BLDC motor use in appliances and equipment.

### Project Requirements

We are seeking a well-qualified individual or research team to conduct a thorough investigation into the current and prospective future market for BLDC motors for use in on-, off-, and weak-grid appliances and equipment (e.g., fans, refrigerator compressors, solar water pumps, grain mills). This research effort is intended to be primarily desk-based with information drawn from reviews of pre-existing research on motor applications in off- and weak grid areas, from a range of sources. The research team will be expected to carry out independent interviews with stakeholders including electric motor manufacturers and distributors, off- and weak-grid



appliance manufacturers and distributors, energy efficiency experts, standards development organizations, and others with first-hand knowledge of the topic.

Specific tasks envisaged for this effort are as follows. Respondents should feel free to edit or augment this list in their proposals.

1. Conduct a literature review and stakeholder consultations to characterize the existing market for BLDC motors:
  - a. Quantitatively assess the current total global demand and future market potential for BLDC motors, with emphasis on motors appropriate for use in household appliances and productive use equipment.
  - b. Develop a taxonomy for segmenting the BLDC motor market according to size, form factor, and/or other technical and performance criteria.
  - c. For all identified market segments, define current market-average and best-in-class performance and price. Project future improvements (through 2030) in performance and price that are achievable through technology improvement and/or market scale-up.
  
2. Conduct a literature review and stakeholder consultations to characterize the future trajectory of the BLDC motor market for off- and weak-grid appliance applications:
  - a. Develop a list of off- and weak-grid domestic and productive use appliance applications (present-day and future) that may make use of BLDC motors. For each application, identify:
    - i. basic motor requirements in terms of torque, speed, position control, mechanical interface, ingress protection, etc.
    - ii. challenges to adoption and use of BLDC motors versus incumbent motor technologies.
  - b. Develop 2 case studies to highlight BLDC motor success stories relevant to off- and weak-grid appliances.
  - c. Characterize opportunities for demand aggregation within the off- and weak-grid appliance sector by identifying applications that may be able to incorporate common motor designs.
  - d. Quantitatively assess the benefits of BLDC motors versus incumbent motor technologies for off- and weak-grid appliances in terms of delivering maximum energy access outcomes with minimum climate and environmental impacts. Estimate in particular the global GHG emissions reductions that may be achieved through BLDC motor adoption.
  
3. Identify opportunities to advance performance, market uptake, and standardization of BLDC motors for off- and weak-grid applications
  - a. Identify existing design, performance, and quality standards for BLDC motors (or other motor types) that may be used as a reference in future quality and performance standards. Identify areas (e.g., reliability, durability) where standards will need to be enhanced for off-grid applications.
  - b. Identify the possible elements of a motor standard (sizing, electrical interface, mechanical interface, etc.) for off-grid and weak-grid compatible appliances. Reference the EforA [Compatibility & Interoperability Technology Roadmap](#) and the [Solar Water Pump Technology Roadmap](#).



- c. Identify a list of organizations (manufacturers, industry associations, etc.) and individuals that should be invited to participate in future Efficiency for Access BLDC motors-related activities.

### Geographic scope

This research effort should focus on markets for end-use products incorporating BLDCs in East Africa, West Africa, Southern Africa, and South Asia as well as any other national or regional markets where evidence indicates substantial market potential for BLDC motors.

### Outputs

The final output of the project will be a 30 to 50 page report (plus annexes) that addresses all of the Project Requirements detailed above. The report should include a 1-page Executive Summary, figures and tables with referenced sources, and a discussion of areas for further research. The consultant will also deliver a webinar to the LEIA team and potentially external stakeholders.

### Proposal

Interested parties should submit a technical and financial proposal for preparing the market study specified above.

Proposals should include an elaboration of the following, at a minimum:

- Research methods to be employed
- Preliminary list of resources to be used to gather evidence
- Preliminary list of partner organisations to be consulted
- Research team qualifications and relevant experience
- Evidence of past success delivering related projects

### Delivery Requirements and Timeline

- The project will start in February 2020, with a kick off meeting with the LEIA team.
- Throughout the project parties will be expected to give a fortnightly update to the LEIA team to track progress.
- The first draft report is due for review by 30 April 2020.
- The final report is due 31 May 2020.

### Submission

Parties that wish to respond to this RFP must complete the LEIA prequalification questionnaire on [the website here](#). This is a requirement for all sub-recipients of UK DFID funding. Companies or individual consultants must also register as a CLASP Implementing Partner. Registration is easy and must be completed via [the CLASP website here](#) before final submittal.

Interested parties are required to submit two separate proposals: A Technical Proposal and a Financial Proposal. The files should be named as per the following example: “[Contractor Name] \_ [Technical/Financial] Proposal\_RFP [Name].”



The Technical Proposal should not exceed 15 pages in length and must include the following elements:

- A detailed approach and methodology for implementation and management of the project. [3 to 6 pages]
- A summary of qualifications of key personnel that will be engaged in the assignment. Technical knowledge of BLDC motor technologies and applications is required. An understanding of off- and weak-grid appliance markets is an advantage, as are academic research qualifications e.g. PhD/MRes (Master of Research). [2 to 5 pages]
- A summary of related research experience. [2 to 4 pages]

The Financial Proposal must include the following elements:

- Detailed budget estimate (in US Dollars) outlining fees and expected expenses for the duration of the project. Detailed budget should include all direct and indirect cost estimates for executing the project and include a breakdown (in days) of the level of effort associated and daily billing rate for each task.

A committee comprised of CLASP and EST will evaluate proposals received from respondents. Selection of the candidate will be based upon the following criteria:

- Robustness of proposed methodology
- Relevant qualifications, including working knowledge of the off-grid energy sector, experience in monitoring and evaluation and impact assessment, and broad technical knowledge in mechanical/electrical engineering.
- Total cost and value for money.

The deadline for application is March 5, 2020. Proposals must be submitted online via the CLASP website.

All questions may be addressed to Stephen Pantano at [spantano@clasp.ngo](mailto:spantano@clasp.ngo). The last date for submission of questions related to this RFP is February 20, 2020. We request all inquiries be made by e-mail.