



OVERVIEW: Study on Native and Non-native Mode Operation of Off-Grid Appliances

INTRODUCTION

The UK Aid-funded Low Energy Inclusive Appliances programme (LEIA) aims to accelerate the availability, affordability, efficiency, and performance of a range of appliances particularly suited to off- and weak-grid market segments in developing countries.

The LEIA programme is delivered through an international Efficiency for Access Coalition convened by UK Aid and Power Africa, involving a range of co-funders including Lighting Global, Rockefeller Foundation, Shell Foundation, Sida, EnDev, Good Energies Foundation, and more. The Efficiency for Access Coalition is coordinated by CLASP and the Energy Saving Trust. CLASP is the leading international voice and resource for appliance energy efficiency policies and market acceleration initiatives. The Energy Saving Trust (EST) is a world-leading research centre specializing in energy efficiency product verification, data and insight, advice and research.

The LEIA programme is conducting a study to examine the effect on appliance efficiency, performance and cost from operating appliances outside their native state, ie AC appliances running on a DC connection using an inverter, and DC appliances operating on rectified alternating current. This is to inform the programme's aim of supporting the market to improve the cost and efficiency of off- and weak-grid appliances. To deliver this, the programme is soliciting cost estimates for testing and consultancy services.

Information on test parameters and methods, timelines, and submittals, is provided in a Terms of Reference document and separate RFP documents for the different product types to be tested.

BACKGROUND

Observations from specific off-, weak- and mini-grid use cases has identified that there is more to be learned on how the efficiency, performance and durability of appliances is affected by operation outside their 'native' mode of DC or AC, how this compares to native mode operation, and what the cost differences are (both capital and operational). End users of appliances in this context may be in a position where either a DC or AC appliance is available to them, in combination with various power supply options which may include a SHS, DC or AC mini-grids, or grid connection (of varying reliability), which may or may not be directly compatible with the appliance. Effective support of the off-grid appliance market must take into account the various combinations of supply and appliance, whilst considering the overall direction of future electricity supply.

In the context of the LEIA project, it is key to understand the different cases by which an end-user might operate an appliance outside its native state and whether this helps or hinders the user's electricity access, and the affordability, performance and durability of the appliance. This project will conduct testing of various product types in native and non-native modes to assess the above factors.



SCOPE OF WORK

This testing is divided into two phases.

Phase 1. Comparative appliance testing.

- Following a consultation period to agree final test procedures, tests will take place to evaluate and compare the energy consumption and off-grid appropriateness of products both in native and non-native modes. Some aspects of tests are expected to be based on the test methods used in the [Global LEAP Awards Programme](#). These test methods heavily leverage existing internationally-accepted test methods, such as those developed under the IEC. In some cases, the referenced methods are modified for off-/weak-grid appropriateness.
- Testing of various inverters and rectifiers, to assess their efficiency and performance.

RFPs issued:

- RFP 01-19: Testing and Consultancy for Study of Native and Non-native Mode Operation of AC and DC Refrigerators.
- RFP 02-19: Testing and Consultancy for Study of Native and Non-native Mode Operation of AC and DC TVs.
- RFP 03-19: Testing and Consultancy for Study of Native and Non-native Mode Operation of AC and DC Fans.

Phase 2. Follow-up tests from phase 1 observations and ad-hoc testing.

Following a further consultation period, follow-up tests informed by phase 1 findings will be conducted. In addition, testing to address any other relevant areas proposed in the consultation will be considered as part of this phase. Exact tests to be conducted are TBC, but may include:

- Comparative testing of variable and low-power loads in native and non-native states
- Testing multiple appliances to simulate a use case
- Testing the efficiency, performance and durability of products suitable for use on either current
- Testing types of appliances and machinery not covered in phase 1 in native and non-native modes

RFP to be issued shortly.

DELIVERABLES

At the end of the project, EST will submit a final report detailing the findings and conclusions from Phases 1 and 2 of testing and making recommendations.



TIMELINE

Consultative work to finalize the test method will begin immediately upon award of contract and is expected to begin in February 2019. Consultants will work as part of a small team and will be required to participate in meetings and/or conference calls.

Testing will commence as soon as the test methods are finalised and is expected to continue until the end of May 2019. The exact testing start date will be coordinated with the contracted test laboratory or team after contract execution.

SUBMITTAL

Companies and organizations that wish to respond to the associated RFPs must complete the [LEIA prequalification questionnaire](#). This is a requirement for all sub-recipients of UK DFID funding.

Companies must also register as a LEIA Implementing Partner. Registration is easy, and must be completed via the [CLASP website](#) before final submittal.

INFORMATION FOR POTENTIAL APPLICANTS

Confidentiality Statement

All data and information received from test laboratories or other entities for the purpose of this assignment are to be treated confidentially and are only to be used in connection with the execution of this assignment. All intellectual property rights arising from the execution of this assignment are assigned to LEIA program donors and their designees. The contents of data sets or written materials obtained and used in this assignment may not be reused or disclosed to any third parties without the expressed advance written authorization of LEIA designees.