

RESEARCH AND DEVELOPMENT FUND PROJECT SPOTLIGHT

ISR - UNIVERSITY OF COIMBRA

DESIGN AND DEVELOPMENT OF SUPER-EFFICIENT REFRIGERATORS WITH PHASE CHANGE MATERIALS (PCMS)

This project will develop an affordable, super-efficient refrigerator suitable for off- and weak-grid areas. It will use a variable speed compressor and PCMs. Furthermore, a smart control system will be developed to manage the refrigerator charge/discharge.

The project will develop both a vertical and a horizontal refrigerator. The outer shells of these refrigerators will be based on existing low-cost, energy-efficient, AC refrigerators.

Refrigerators will have PCMs and fittings, which allow for flexible load control. Furthermore, a variable speed compressor with a smart controller will allow end-users to manage the on-time and charge time of the refrigerators.

Additional features include the ability to handle voltage spikes, as thunderstorms are very frequent in many African countries. The refrigerators will also have two temperature-differentiated cold storage areas. Using PCMs with different phase change temperatures will also make temperature layering possible.

To help people with disabilities reach every item in the refrigerator, there will be a metallised, thin-film, non-condensation mirror installed inside the cover door. Special picking handles offer additional support and will be especially useful in the horizontal model.

For quality assurance, a test chamber will be used to simulate the conditions of temperature and humidity in most Sub-Saharan African countries. The project's main objective is to develop an affordable super-efficient refrigerator for off- and weak-grid settings, powered by a PV system, with charging periods managed by a smart controller.



AT A GLANCE

R&D Partner

ISR - University of Coimbra

Efficiency for Access Funding

£102,881

R&D Funding Unlocked from ISR - University of Coimbra

£11,431

Project Location

Portugal