LEAP-RE

Research and Innovation Action (RIA)

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http://www.leap-re.eu/

Report about the outcome on scientific collaboration WP10

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Summary

The LEAP-RE project, launched by the European Union in 2020, enabled a dynamic Africa-Europe partnership to tackle clean energy challenges in rural Africa through the PURAMS project. PURAMS developed a solar-powered cooking appliance tailored for communities in Kenya, Mozambique, and Rwanda. Six key partners?Strathmore University (SU), Laboratório Nacional de Energia e Geologia (LNEG), Africa Energy Services Group (AESG), Rural Electrification and Renewable Energy Corporation (REREC), University of Cordoba (UCO), and Eduardo Mondlane University (UEM)?each brought specialized expertise to the initiative. Strathmore University led overall project management and technical development of the cooker, using insights from local energy needs and cooking habits. LNEG contributed solar expertise, conducting assessments and crafting a sustainable business model. AESG engaged policymakers to advocate for supportive regulations, while UCO customized solar PV technology to optimize performance in rural settings. UEM?s socio-economic analysis ensured the appliance met local requirements, and REREC led training to enable sustainable, community-based installation and maintenance. Despite challenges from COVID-19 restrictions and logistical hurdles, this collaboration produced a clean cooking prototype adaptable for local use. The project?s outreach through publications, webinars, and forums further strengthened community and policymaker support, setting the groundwork for widespread adoption of solar cooking solutions. The team recommended engaging communities in policymaking, creating incentives for clean cooking investments, and focusing on locally relevant, accessible technologies to maximize impact. The PURAMS project?s success underscores the value of collaborative, community-focused efforts in advancing sustainable energy in Africa.

Approval

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LEAP-RE

Long-Term Joint EU-AU Research and Innovation Partnership on Renewable Energy

Research & Innovation Action

November 2024

Outcome on Scientific Collaboration

Version N°1

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Abbreviations and Acronyms

Acronym	Description
WP	Work Package
PURAMS	Productive Use in Rural Market using Standalone Solar
SU	Strathmore University
LNEG	Laboratório Nacional de Energia e Geologia
AESG	Africa Energy Services Group
REREC	Rural Electrification and Renewable Energy Corporation
UEM	Eduardo Mondlane University
UCO	University of Cordoba
VIA	Village Infrastructure Angels
MECS	Modern Energy Cooking Services

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Executive Summary

The LEAP-RE project, launched by the European Union in 2020, enabled a dynamic Africa-Europe partnership to tackle clean energy challenges in rural Africa through the PURAMS project. PURAMS developed a solar-powered cooking appliance tailored for communities in Kenya, Mozambique, and Rwanda. Six key partners—Strathmore University (SU), Laboratório Nacional de Energia e Geologia (LNEG), Africa Energy Services Group (AESG), Rural Electrification and Renewable Energy Corporation (REREC), University of Cordoba (UCO), and Eduardo Mondlane University (UEM)—each brought specialized expertise to the initiative.

Strathmore University led overall project management and technical development of the cooker, using insights from local energy needs and cooking habits. LNEG contributed solar expertise, conducting assessments and crafting a sustainable business model. AESG engaged policymakers to advocate for supportive regulations, while UCO customized solar PV technology to optimize performance in rural settings. UEM's socio-economic analysis ensured the appliance met local requirements, and REREC led training to enable sustainable, community-based installation and maintenance.

Despite challenges from COVID-19 restrictions and logistical hurdles, this collaboration produced a clean cooking prototype adaptable for local use. The project's outreach through publications, webinars, and forums further strengthened community and policymaker support, setting the groundwork for widespread adoption of solar cooking solutions. The team recommended engaging communities in policymaking, creating incentives for clean cooking investments, and focusing on locally relevant, accessible technologies to maximize impact. The PURAMS project's success underscores the value of collaborative, community-focused efforts in advancing sustainable energy in Africa.

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1. Introduction

Since its inception in 2020, the LEAP-RE project aimed at creating pathways for an Africa-Europe collaboration in research and innovation. 85 partners from 33 countries over the past 4 years have created a framework, methodology and cooperation model through a quadruple helix approach that has seen the involvement of government (funding agencies and programme owners), research and academia and the private sector. As the project approaches its end in 2025, 8 key projects, under Pillar 2, that have been based on internal consortium research and innovation projects and capacity building activities have an opportunity to present on the impact of collaboration. WP10 - PURAMS, which amongst the 8 projects, was the only innovation project in Pillar 2. The PURAMS (Productive Use in Rural African Markets using Standalone Solar) project aimed to develop a standalone solar cooking appliance to address the problems caused by traditional cooking methods in African communities. The project was implemented in 3 African countries; Kenya, Mozambique and Rwanda.

The project involved six partners - 2 from Europe and 4 from Africa - namely Strathmore University (SU), Laboratório Nacional de Energia e Geologia (LNEG), Africa Energy Services Group (AESG), Rural Electrification and Renewable Energy Corporation (REREC), The University of Cordoba (UCO), and Eduardo Mondlane University (UEM). SU was the work package leader. With little to no data on the outlook on local food types and required technical parameters to design off-grid appliances based on energy consumption, type of food and cooking time, the project developed a methodology for data collection that informed the design of the cooker. The partners, through their lead tasks, developed design metrics for both the cooker and the solar PV (modules), applicable business models and relevant market, capacity and policy analysis to support the off-grid appliance sector.

In addition to building the prototype, the partners published and presented at the CIES 2022 – International Congress on Solar Energy Participation in Pamla Spain, were featured in the University World News and hosted a webinar on progress made on solar cooking in Africa. Part of the team also participated in training Master students and early career researchers on resource assessment and data collection methodology at the 2 previously held LEAP-Re stakeholder forums in South Africa (2022) and Rwanda (2023). A joint journal publication with some of the deliverable's outcomes is also available in open-access format.

This report provides an overview of the collaborative efforts and dissemination activities of the project highlighting the challenges, lessons learnt, opportunities and successes through the research period.

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2. Activities and accomplishments

The project's main objective is to develop a standalone solar cooking appliance (cooker), to address the challenges caused by traditional cooking methods and faced by rural communities in Africa. This involves studying cooking in 3 countries specifically: Kenya, Rwanda and Mozambique and developing solar- powered clean cooking solutions for these areas. The specific objectives of the project can be summarized as follows:

1. To do an off-grid market assessment for solar cooking, a solar resource assessment to enable cooker design and capacity assessment to support piloting of systems.
2. To develop a standalone solar cooker and pilot it.
3. To identify business models and engage policy makers to create an enabling environment.
4. To develop or improve solar photovoltaic module technology for use in the cooker design.

Building upon the project's primary objective and the listed specific objectives, the following tasks were undertaken:

1. Task 10.1 - Resource assessment and business model development
2. Task 10.2 - Productive use: Standalone solar cooking and piloting
3. Task 10.3 - Market, capacity assessment and policy environment
4. Task 10.4 - Solar photovoltaics technology
5. Task 10.5 - Project management and dissemination

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2.1 Collaborative overview

Table 1: A description of partners and activities under the main work package tasks

Task		Partners		Activities
No.	**Description**	**Lead**	**Contri-butors**	
10.1	Resource assessment and business model development	LNEG	SU, AESG, REREC, UEM, UCO	This task provides data to support other tasks, technical design parameters to be observed during the development stage of the cooker and evaluates the commercial viability of the developed cooker. It includes the following activities: 1. Identification of the databases available to support the activities of the project and data collection in Kenya, Rwanda, and Mozambique. 2. Demand assessment and development of load profiles. 3. Development of business model for Kenya, Rwanda, and Mozambique.
10.2	Productive use: Standalone solar cooking and piloting	SU	AESG, REREC, UEM, UCO, LNEG	This task aims to develop a standalone cooking appliance (cooker) that's suitable for rural Africa communities. Data collected and the analysis done in Task 10.1 feeds into this task whose activities are as follows: 1. Design of the cooker based on an outlook of the collected data 2. Development of the cooker through prototyping based on the design iterations and

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				performance during simulation. 3. Piloting of the cooker using both recommended and fabricated modules.
10.3	Market, capacity assessment and policy environment	AESG	SU, REREC, UEM, UCO, LNEG	This task provides an overview of the target market of the solar cooker, acceptability of the cooker in the target market and outreach required to promote acceptance and adoption of the cooker by local communities. The task also assesses the policy landscape and engages policy makers. It includes the following activities: 1. Engagement with policy makers to educate them on the benefits of electric cooking in general especially with regards to healthcare 2. Mapping of electric cooking product value chain to serve as a high level visual of the placement of the cooker in the sector in Kenya, Mozambique, and Rwanda 3. Capacity needs assessment of the standalone solar cooker to anticipate and prepare for it. This focuses on repair technicians and solar PV installation training.
10.4	Solar photovoltaic technology	UCO	SU, AESG, REREC, UEM, LNEG	This task recommends the solar technology to be used in the cooker based on parameters as stated by relevant standards, expert and user experiences. It also supports the fabrication of an improved solar technology for use in the laboratory pilot of the solar cooker. This task includes the following activities: 1. Assessment of the existing solar PV technologies on

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				parameters such as ease of cleaning, cost effectiveness, ease of installation, performance in the given environment and accessibility of the technology. Field experts from the given localities were consulted for their experience working with the different technologies, 2. Selection, improvement, and fabrication of the most suitable PV technology taking into consideration cost and performance implications. 3. Assessment of the performance of the PV modules to ensure their safety of use and compliance with the initially identified parameters of interest. This includes both laboratory and outdoor tests
10.5	Project management and dissemination	SU	AESG, REREC, UEM, UCO, LNEG	The management activity is developed in accordance and coordination with the WP3 leaders (Pillar 2 coordinators) and in synergy with other WPs constituting the Pillar 2. This task includes the following activities: 1. Administrative and financial management. Specifically, the activity involves communication management with Pillar 2 coordinators and cost management of project funds. 2. Coordination of project activities between WP members and Pillar 2 coordinators. 3. Monitoring quality and timing of the deliverables of the project 4. Disseminating the obtained results of the project in the

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				form of reports, blog posts and webinars. 5. Liaising with Pillar 2 Leadership through communication of regular updates on the progress of the tasks, actions and reactions.

2.2 Description of the work carried per work package

Table 2: Work package tasks and their outcomes

Task	Action No	Technical work	Outcomes
10.1 - Resource assessment and business model development	1	**Data collection:** Data collection in Kenya, Mozambique and Rwanda on energy consumption, types of food, existing equipment for cooking, cooking times and other data points relevant to the project. Data was also collected to assess the solar resources in these countries and to select the most reliable database for this purpose.	• Data points that inform the development of the standalone solar cooker in Kenya, Rwanda and Mozambique. • Identification of the most reliable database for solar resource assessment.
	2	**Demand assessment and development of load profiles:** From the above collected data, analysis was done and suitable load profiles generated. This included: available solar resources during the times of use of the cooker.	• Load profiles for the 3 different countries • Report on resource availability and time of use of the cookers.

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	3	**Development of business model:** Business models of the 3 different countries were explored, and the most suitable models were adopted and developed.	• Suitable business models for the 3 different countries
10.2 - Productive use: Standalone solar cooking and piloting	1	**Design of the cooker:** From the cooking profiles developed from data collected in Task 10.1, the suitable cooker technology was selected and designed.	• Design of the standalone solar electric pressure cooker
	2	**Development of the cooker:** The selected design was used in the development of the cooker's first prototype. The selection was dependent on the performance during simulation and design iterations. The prototypes were tested extensively in the laboratory, prospective users were consulted and improved the design and selected the final design for piloting.	• Final design of the standalone solar cookers • First prototype of the cookers
	3	**Piloting of the cooker:** The standalone solar cookers were developed and piloted in a laboratory, using both recommended and fabricated modules to ensure their safety and functionality. Households in three countries were selected for piloting. Data collected from these pilots was analyzed to refine the cooker design, culminating in a final report.	• Safe and functional solar cookers • Data from the laboratory and households on the solar cooker prototypes.
10.3 - Market, capacity assessment and policy	1	**Engagement with policy makers:** The objective was to educate policymakers on the significance of electric cooking. Policymakers were identified, and baseline interviews were conducted to incorporate their	• Informed Policy development • Improved policies, regulation and legal frameworks

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environment		insights into the webinar and workshop agendas. Additionally, existing policies, regulations, and legal frameworks were thoroughly analyzed, leading to recommendations for potential improvements.	
	2	**Mapping of product value chain:** To gain a high-level visual of the cooker's potential placement within the sector in the three countries, an electric cooker's value chain map was developed, and marketing methods were identified. This involved studying the current state of the value chain, identifying key stakeholders, collecting data, mapping the product value chain, and determining appropriate marketing strategies.	• Reliable visual of the cooker's potential placement • Suitable cooker's value chain map
	3	**Capacity needs assessment:** Given that all electric appliances, including the solar cooker, require repair technicians and solar PV systems necessitate solar installation training, we analyzed the capacity needed for the standalone solar cooker. This involved summarizing the capacity needs analysis, engaging with capacity building institutions, and developing strategies to facilitate curriculum development.	• Improved curriculum for electrical repair and solar PV installation. • Insights on capacity needs of the 3 different countries with regards to the solar cooker.
10.4 – Solar photovoltaics technology	1	**Existing solar PV technologies:** To determine the most suitable existing solar PV technology, we assessed various options based on factors such as ease of cleaning, cost-effectiveness, ease of installation, and performance. Gathering expert and user input through interviews and consultations ensures that the	• Identification of the most suitable existing solar PV technology • Development of a set of key parameters for the PV fabrication • Ensured alignment with standards and user needs

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		selected technology aligns with relevant standards while also addressing the needs and preferences of both groups. Along with the cooker prototype energy requirements identified in Task 10.2 and the cooking profiles and habits from the three countries in Task 10.1. a set of key parameters was established.	
	2	**Fabrication of selected PV technology:** Upon selection of the suitable PV technology, improvements were made, and the technology was fabricated in the laboratory. This involved sourcing fabrication components, laboratory preparations, fabrication of the technology, and iterative testing to improve the PV technology.	• Fabricated PV technology • Availability of fabrication components • Improved Solar PV technology
	3	**Assessment of the performance of the PV modules:** The fabricated PV modules were later tested in the laboratory, where their performance was assessed against relevant standards, safety requirements, and simulated parameters. Additionally, a field test was conducted. This involved selecting a suitable location based on applicable standards, developing specific field-testing procedures, and then testing the modules in the chosen location.	• Assessed Performance of the Solar PV modules • Valuable data on the Solar PV module's performance against relevant standards
10.5 – Project Management and Dissemination	1	**Administrative and financial management:** This activity involved communication management with pillar 2 coordinator and cost management of project funds.	• Effective communication between Pillar 2 coordinators and WP members • Transparent and efficient cost management.

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	2	**Coordinate project activities:** Coordinated project activities between WP members and Pillar 2 coordinators. It involved time and scope management of the project activities	• Enhanced project efficiency • Improved project coordination
	3	**Monitor quality and timing of results' delivery:** Used monitoring and evaluation techniques to monitor the quality and timeline of the project's deliverables	• Quality assurance • Timely delivery • Project risk mitigation
	4	**Disseminate the obtained results:** Disseminated results of the project in form of reports, blog posts and webinars.	• Increased awareness and knowledge on the project
	5	**Liaise with Pillar 2 Leadership:** This involves communication between WP10 participants and the Pillar 2 leadership, where updates are provided on the progress of the tasks, actions, and sub-actions within the project.	• Improved project communication and coordination

2.3 Milestones and deliverables

Table 3: An overview of deliverables under the work package

List of Del.	Deliverable name	Lead Beneficiary	Type	Dissemination level	Due date
D10.1	Presentation of a more detailed Plan of	SU / AESG	Report	Public	7/20/2021

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	Activities for the whole 10				
D10.2	Standalone solar cooking appliance design metrics	LNEG	Document	Confidential	12/27/2022
D10.3	Business model for standalone solar cooking appliance	LNEG	Report	Public	8/9/2024
D10.4	First design of standalone solar cooking appliance	SU	Document	Confidential	1/30/2023
D10.5	Prototypes of standalone solar cooking appliance	SU	Demonstrator and report	Confidential	3/12/2024
D10.6	Report on field testing of standalone solar cooking appliance	SU	Report	Public	5/6/2021
D10.7	Report on policy, legislative and regulatory environments	AESG	Report	Public	10/3/2023
D10.8	Report on value chain and social factors	AESG	Report	Public	5/6/2021
D10.9	Progress report on choice of solar photovoltaic technology	UCO	Report	Public	1/10/2023

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D10.10	Report on field performance of solar photovoltaic modules	UCO	Report		7/17/2024
D10.11	Final report preparation	SU	Report		8/31/2022
D10.12	Report about the outcome on scientific collaboration WP10	SU	Report		8/31/2022

We successfully achieved milestone **MS6**, titled ***"Launch of the Projects (Pillar)"***, which was scheduled for completion in the 7th month. The milestone was verified through the kick-off meeting.

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3. Dissemination and Communication activities of the project

The activities and outcomes of this project intend to contribute to increase the quality of life of African communities by increasing access to clean cooking technologies. Being a sensitive topic that depends directly on the specificities of each country, it was present from the very beginning of the project's idea that there should be a strong involvement with the communities and stakeholders. In this sense, Task 10.3 specifically focuses on the engagement of stakeholders and policy makers, and the development of questionnaires to contribute to the development of clean e-cooking and understand the barriers to this development and, on the same time, collect suggestions on how to overcome these barriers.

LNEG represented the PURAMS project in a Greendeal webinar having the opportunity to meet other projects that integrate the clean cooking problematics. An example was the SophIA project where future synergies are to be discussed still in the scope of LEAP-RE project.

In the final part of the project, the main outcomes were presented on a webinar organised by the consortium. This webinar was divided into two parts, one dedicated to the outcomes of the project and another dedicated to external speakers. A representative from the SophIA project was invited to speak and the organizer of the international conference Consol food. This webinar discussed especially technical aspects, but the need to understand and discuss the finances part of the problem paved the way for the organisation of a second webinar that will take place in November 2024. Finally, there was a participation in the RESchool organised in Kigali together with the annual LEAP-RE stakeholders forum, and there will be a second action dedicated to clean cooking in the RESchool that will take place in Milan in October 2024.

3.1 Dissemination

During this project several dissemination activities were conducted, namely, the participation in conferences and publication of the project's outcomes in scientific journals.

At the time of this report's elaboration, there is a journal paper being developed about the conducted surveys and socio-economic context in the target countries. It is expected that this paper is submitted before the end of 2024 and still during the LEAP-RE activities.

In addition, two research papers meant for journal publication are being developed under the two thematic areas: Value chain development and policy frameworks outlook with a particular bias on the Kenyan state.

1. Papers on journals

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In the sequence of LNEGs participation in the Iberic and Iberic-America Solar Energy Congress, in Palma in 2022, the **Solar Resource and Energy Demand for Autonomous Solar Cooking Photovoltaic Systems** (Cardoso, et al., 2023) conference paper was awarded the possibility to publish in a scientific Journal. Teresa Simões and António Couto also presented a non-technical paper titled **'Cooking habits and EPCs experiment in Rwanda'**, Technical Note, pp. 12, March 2023.

By the end of the activities, SU, LNEG and UEM started a joint publication related with the socio-economic component of the surveys. The paper titled **"Socio-economic Context of Renewable Energy Solutions Appliances in African Countries – A Case Study"** will be presented by Ines Raimundo of UEM in a lecture titled Integration of the Displaced Population in Host Communities as part of Peacebuilding Actions in the Context of the Climate Crisis and Armed Attacks. This lecture is part of the celebration of 32 years of peace in Mozambique.

2. Conferences

During this project the following participations in conferences dedicated to Solar Energy and Solar Cooking took place and are listed in Table 4. In ConsolFood 2023 event, a roll-up and leaflets were produced to disseminate the project and its activities among the conference participants. These materials are currently at LNEGs premisses and available for the researchers and visitors in general. This enables a broader dissemination of the project. The participation in this event contributed for a very interesting networking based on the conversation with other participants and already having enabled the participation of the organizer on the first Webinar organised by the project.

Figure 1: Participation of LNEG's team in the International Congress of Solar Energy (CIES2022) in Palma, Spain, June 2022.

Table 4: List of conferences attended

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Name of Conference	Title of the paper/presentation	Participation
CIES 2022 – International Congress on Solar Energy	PROJETO LEAP-RE/PURAMS - FOGÕES SOLARES AUTÓNOMOS PARA ÁREAS RURAIS Couto A., Cardoso J.P., Costa P.A., Facão J., Loureiro D., Rodrigues C., Wambugu A., Banda S., Simões T.	Paper conference and presentation by Teresa Simões.
ConsolFood 2023 - Fifth International Conference: CONSOLFOOD 2023 12-13-14 July 2023 / LA CORUÑA-SPAIN - http://www.consolfood.org	Assessment for solar e-cooking at the Productive Use in Rural African Markets using Standalone Solar (PURAMS) project Simões T., Banda S., Wacera A., Chepkorir S.B., Oribo N., Cardoso J.P., Costa P.A., Couto A., Facão J., Loureiro D., Rodrigues C.	Presentation with no paper

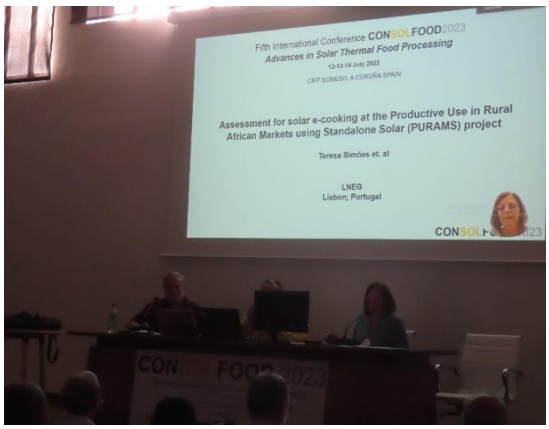

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Figure 2: Pictures at the ConsolFood 2023 event

3.2 Exploitation

After creating an initial design for solar-powered cookers, the SU team opted to use standard heating parts to speed up development and allow for easy adjustments. They customized the cookers with newly designed hot plates to ensure a secure fit and proper sealing. The design was tested using 3D models to confirm that everything fit together well, then finalized with a local manufacturer to ensure high quality.

Once all parts were ready, the team assembled the cookers and ran safety and performance tests. Adjustments were made to the heating system to ensure even, efficient cooking. Additional tests determined the best timing for switching the heating elements on and off, so the cooker could reach the needed temperature and pressure for safe and thorough cooking.

Laboratory tests included cooking common foods, like rice, beef, and beans, to check cooking quality and energy use. Finally, the team collaborated with Kenya's Rural Electrification and Renewable Energy Corporation (REREC) to install a solar power system and carry out further tests, allowing local communities to see and experience the cookers.

At the final part of the project, a business model was developed establishing the major components of the process, such as the social economic context and key users, major financial schemes and economic indicators for the envisaged product in the Table 5.

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Table 5: Business model overview

Element	Description	Solution
A) Value Proposition	Identification of the problem that is intended to be solved with the product to be marketed/distributed or the need to improve the quality of life of a specific socioeconomic group.	The product will allow its users to cook faster and increase the time available for other tasks or leisure, increasing their quality of life. Moreover, it will bring health benefits by reducing exposure to combustion fumes.
B) Target customers	Identification of the users of the product and how their problems can be solved.	The customers are the users of the stoves that can be domestic, or providers of meal services from home or in commercial establishments – fairs, markets or similar.
C) Distribution channels:	How to reach the target customers. These can be physical channels, such as stores or markets, or virtual channels, such as websites that advertise local businesses, among others.	The dissemination channels will be mixed. Actions will be carried out to disseminate and raise awareness of the use of this type of equipment for a more sustainable kitchen.
D) Customer relations	Demonstrate to customers the added value of the product and prove that it is necessary, keep customers satisfied with the product and loyal to it, and increase the number of customers. To do this, it is necessary to add value and differentiate the product from other competitors.	The use of the renewable system is the added value to be strengthened in this business. In this aspect, some models of stove and electric supply system will be studied in order to develop a product with competitive cost.
E) Return on Investment Channels (Revenue)	Means of generating revenue from the sale of the product, maintenance (if necessary), sale of accessories, advertising, among others.	The revenue is achieved through the selling of the overall equipment that constitutes the system, but especially through installation services that can be done by specialized companies at the beginning but will tendentially end-up being performed also by the seller.

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F) Resources necessary for the implementation of the business	They can be divided into: Physical resources - factory, raw materials, distribution vehicles, machinery, etc.; Human resources; Intellectual resources – trademarks, patents, copyrights, etc., and financial resources – credits and the like.	Ongoing Discussion at the time of the development of D10.3.
G) Key activities	What the company must do to make the business model work. Development of a product or provision of a service, or both.	Product development, user training, sale of equipment and accessories, maintenance, etc.
H) Key partners	These are the partners who will contribute to the operationalization of the business. In this case, it is necessary to make an effective selection of the partners to be included, such as suppliers, advertising agents, among others.	In the particular case of this product, some partners to be included correspond to suppliers, maintenance technicians, advertising agents, local trade agencies and residents, etc.
I) Cost Structure	Identification of the costs associated with operating the business, including rent, employees, materials, business registration, and other costs associated with key activities, key partners, and resources.	See section 4.2 D10.3
J) Prototyping and testing	Development of the prototype and testing with potential users.	Laboratorial testing of the prototypes and experimental campaigns in targeted communities to test the prototypes and promote the interaction with potential users. At this date the last tests are not yet finished.
K) Business registration	This will be the final stage of the business model and	Applicable to companies starting their businesses, especially in the case as the commercial entity

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	signals the start of the new project.	decides to dedicate the activity to this product, considering the overall system. When bringing a new product to an existing business this is not applicable.

Due to the COVID-19 pandemic, there were several delays and the discussion about the means to take the prototypes to a commercial phase were under discussion until the final part of the project. The outcomes of the webinar that will be organized in November will bring new insights to the process and will be made available at the end of LEAP-RE project. Nevertheless, important conclusions were taken from the surveys and overall work developed in this project, such as, that a close involvement of the EPC developers is needed so that they can start incorporating the new changes in the current EPCs, creating a new line of business or create a small factory for this end. This will enable the creation of a new line of business for the selling of the system here developed. Also, a strong involvement of the policy actors that can support both the vendors and the buyers to create a sustainable process towards a high-quality environment for inhabitants through clean cooking in African countries.

3.3 Communication activities

1. Webinars

During the project, as previously mentioned, one webinar titled **'SOLAR POWERED SOLUTIONS: Advancing Clean Cooking Technologies in African Countries'**. This webinar was organised with support from the LEAP-RE's Dissemination Cluster.

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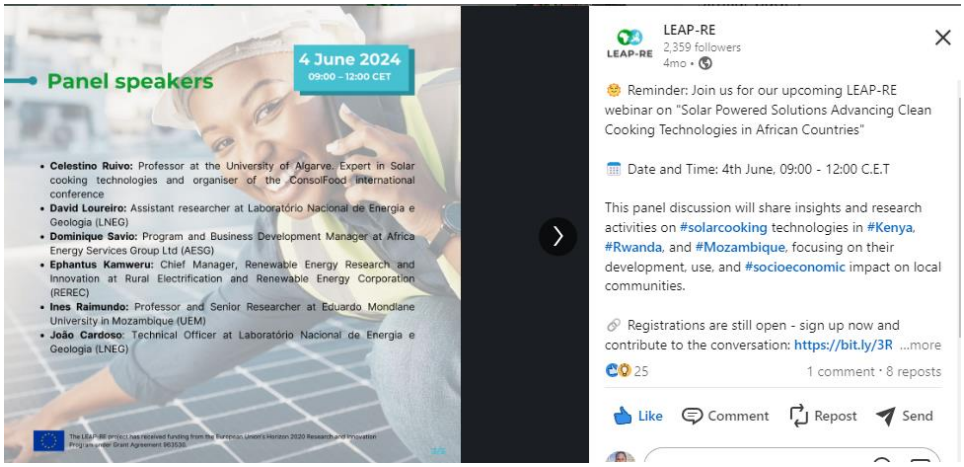

Figure 3: Screenshots of the webinar flyer shared on LinkedIn

This webinar was of utmost relevance for the discussion on clean cooking and had a very high participation. It counted with 80 participants and showed a high interest on the topic. At the end of the webinar, the organizers launched a survey to understand the feedback on the session and decide on next actions that could continue to contribute for the discussion. The objective of the webinar, was to highlight the research activities, results, lessons learnt, projected impacts and challenges that have been carried out in the scope of PURAMS and from external projects researching on solar cooking on the African continent.

On the survey, the participants were asked to list the topics they would like to see in a second webinar, and the results are listed below:

1. **Technological Advancements** - Respondents expressed interest in more detailed presentations on the latest innovations in solar cooking and other clean cooking technologies.
2. **Cost-Effectiveness** - Analysis of cost structures, affordability strategies, and financial models was a common request.
3. **Case Studies and Success Stories** - In-depth case studies of successful implementation projects were sought.
4. **User Adoption and Behaviour Change** - Strategies for promoting user adoption and behaviour change were desired.
5. **Policy and Regulatory Frameworks** - Insights into supportive policies and regulations were requested.
6. **Funding and Investment Opportunities** - Information on available grants and funding programs was sought.
7. **Environmental and Health Impacts** - Detailed studies on the environmental benefits and health impacts of clean cooking technologies were desired.
8. **Integration with Renewable Energy Systems** - Exploration of how solar cooking can be integrated with broader renewable energy systems was requested.

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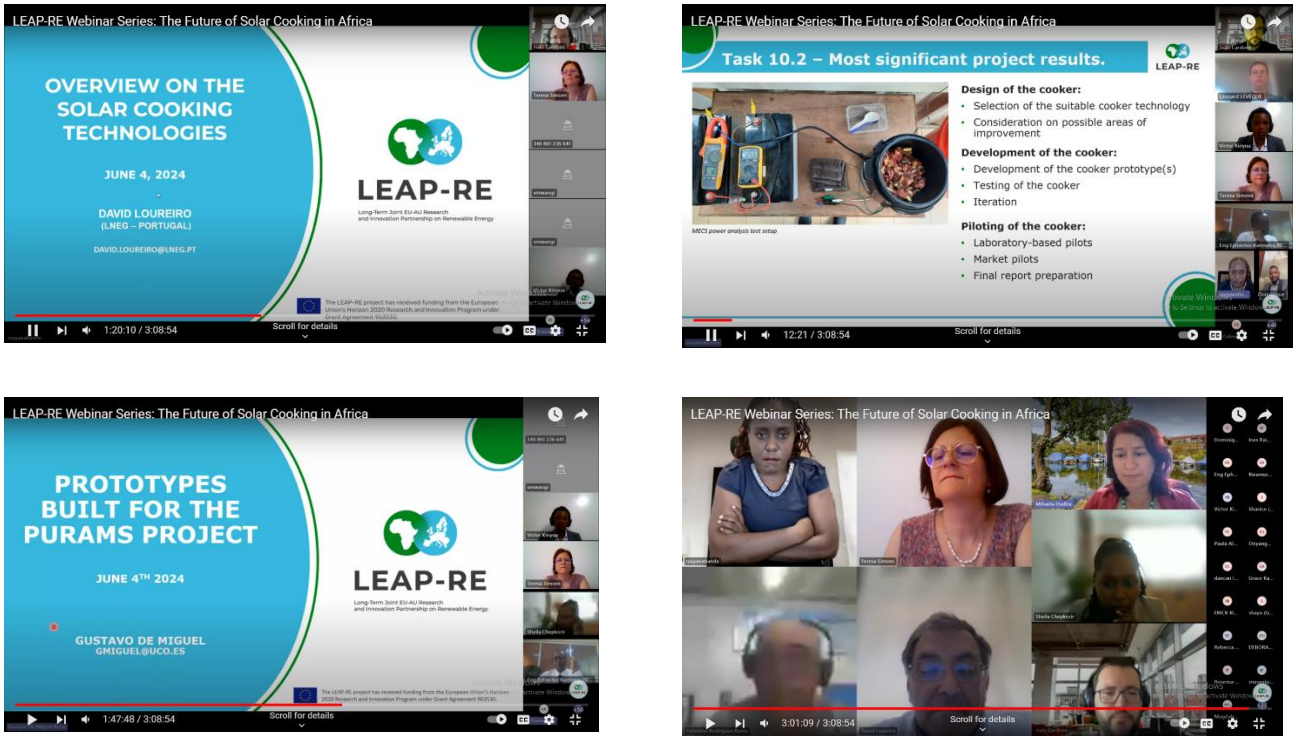

Figure 4: Screenshots of the webinar presentations and attendees

Facing the outcomes of the survey, a new webinar will take place in the end of November 2024, and it will be dedicated to finance and socio-economic aspects.

2. Roll-ups and leaflets
   Some dissemination materials were also developed to enlarge the impact of the project, such as leaflets and a roll-up as seen in Figure 2. Which was used in ConsolFood conference in A Coruña and is currently in exposition at LNEG premises.

3. Institutional website articles

LNEG had a short website article about what LEAP-RE is and its objectives, and how LNEG contributes to the PURAMS project. The article can be accessed through this link.

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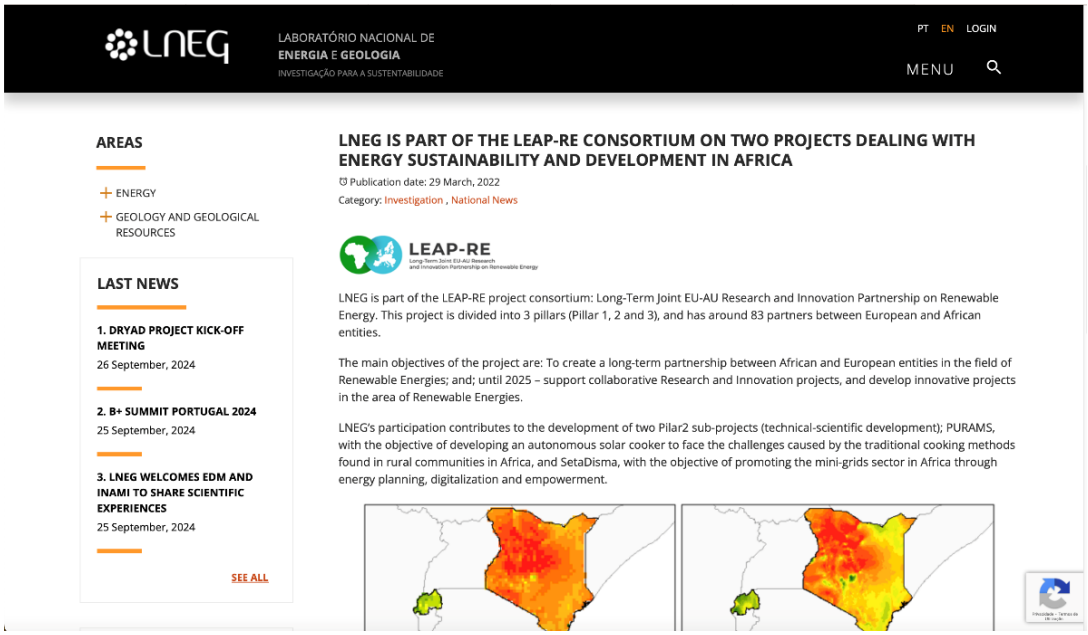

Figure 5: News published on LNEG's web site

Strathmore also published a web article at the inception of the project on EPC cooking demonstration and advantages if using EPCs. The cooking demonstration was in preparation for the launch of the data collection exercise in Kenya. The article can be accessed here.

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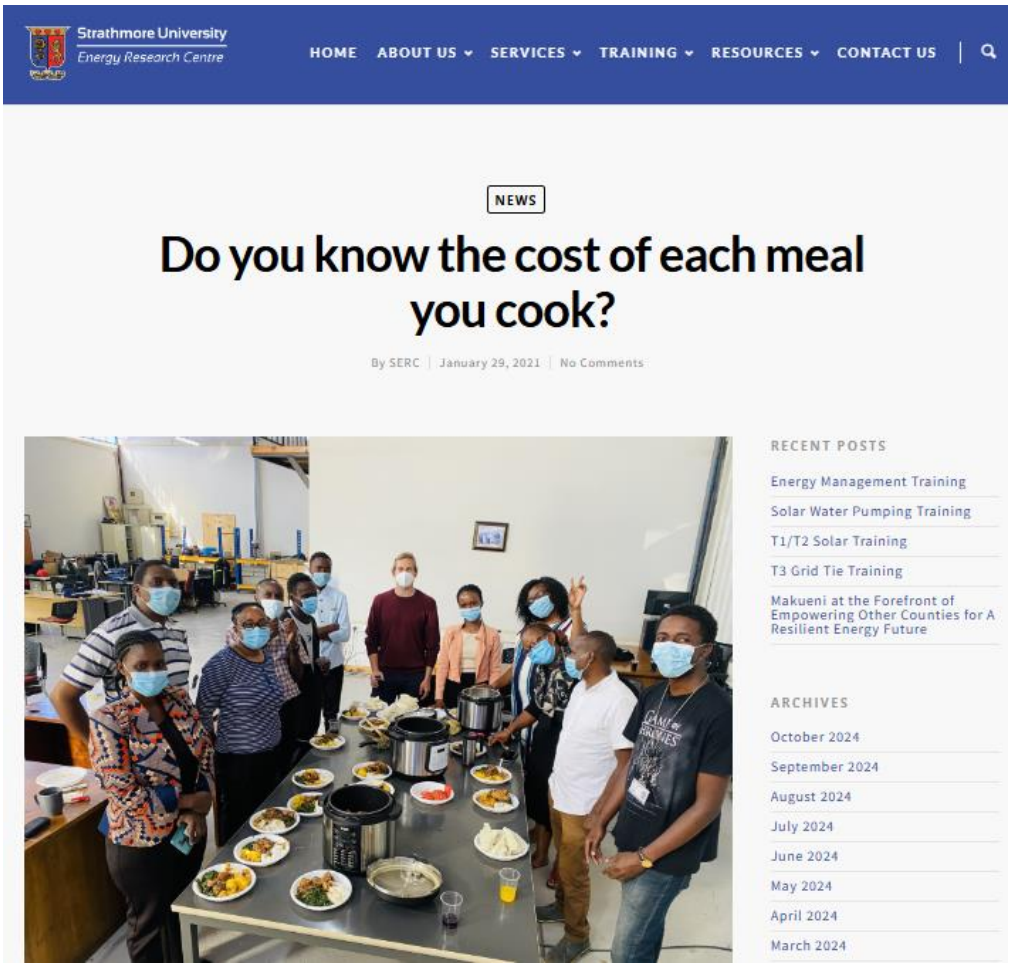

Figure 6: Web article published on Strathmore University's website

4. YouTube

Strathmore, with partnership with VIA and other stakeholders in the e-cooking sector experienced in solar DC EPCs held a training workshop showcasing VIA's 7L standalone DC EPC. VIA and MECS supported Strathmore with EPC cookers for the PURAMS projects to run controlled cooking tests and other lab tests whose results aided in the design of our prototypes.

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Figure 7: Solar cooker highlight video posted on Strathmore University's YouTube page

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4. Final notes

4.1 Lessons

The actions taken in this project enabled the beneficiaries to increase the knowledge on the clean cooking area. More specifically, LNEG has an history on thermal cooking from one side, and on PV research since the early 90's. This project enabled this entity to increase the knowledge on combined applications, increase their visibility in the sector through the participation in several international events, and also to gain more experience on the applications' perception of potential users through the participation on the surveys' data processing and outcomes. This process enabled the expansion of knowledge and the application of existing resource assessment tools to different geographies with varying weather conditions demonstrating the need for continual evaluation of the most reliable databases for this task. Also, enabled the partners to get out of their comfort zone and face the public opinion during the webinar organization hearing and learning from the participants.

4.2 Opportunities and Challenges

The project raised a very high collaboration between institutions and awareness on the needs in different areas of the Clean Cooking sector being able to, soon, foster new collaborations for the development of R&D projects. During the work developed under this project, some publications were made with collaboration of several partners and enabled to find synergies between the institutions in this research area which will motivate the joint participation in futures initiatives, inside or outside LEAP-RE environment.

The biggest challenge that impeded the collaboration efforts for the project was the COVID-19 pandemic. With most countries under lockdown this limited collaboration, and dissemination is mostly virtual through meetings, webinars and blog articles. A significant portion of the activities involved experimental research and surveys requiring public interaction, which were severely delayed due to the pandemic. As a result, the entire project timeline was affected, leading to two extensions of the project's end date to address the initial significant delays. This postponement also affected the delivery schedule of key project deliverables.

Delays in acquiring materials for prototype development further contributed to the overall project delays. Efforts were made to source as many parts and materials as possible locally in Kenya, but the remaining components had to be sourced from China. Due to the specialized nature of these parts, sourcing was challenging, and a third-party Kenyan importer based in China had to be utilized.

Additionally, the theft of PV systems designed for the EPC halted field testing in the three regions. As a result, the prototype tests had to be conducted using off-the-shelf PV systems in Kenya.

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4.3 Recommendations

The outcomes of this project, and especially the stakeholders' consultation and the webinar feedback enabled to elaborate a set of recommendations related with the potential dissemination and exploitation of the prototypes when reaching the commercial phase. The surveys and literature review in what concerns the general income of the end users, especially, the ones located in rural areas, is very low and requires specific measures to overcome that challenge and enable the effective use from those that can benefit from a system like the one developed in this project. In this sense, in the paragraph bellow, a set of recommendations are presented, which in its majority require a strong intervention from the government authorities.

- Community engagement in the policy making from an early stage to make them more tailored to the populations' needs.
- Development of sustainable funding mechanisms towards stakeholder engagements and sensitization of the policy makers for the sustainable and effective implementation of policy and regulatory frameworks.
- Place communities' needs in front of technological advancement in e-cooking to be population's oriented as a main goal.
- Public participation of involved stakeholders in decision making process.
- Introduction of tax incentives' environment to attract clean cooking investment / infrastructure.
- Creation of awareness campaigns from an early stage – education and academic early ages.
- Introduce attractive tariff for e-cooking to enhance adoption.
- Ensure development realizable & well-structured strategies towards clean cooking promotion.

4.4 Conclusion

This document summarizes the collaborative achievements of the PURAMS project, which developed a solar-powered cooking solution tailored to rural Africa. Despite challenges such as COVID-19 disruptions, the consortium successfully designed, piloted, and promoted a clean cooking system suitable for both standalone and grid-connected use. Through data-driven design, stakeholder engagement, and field testing in Kenya, Mozambique, and Rwanda, the project aligned the technology with local needs, fostering strong partnerships across Africa and Europe.

Key recommendations for scaling this innovation include sustained policy engagement, community involvement in policy development, targeted capacity-building, and financial incentives to ensure affordability and adoption. PURAMS not only advanced clean cooking technology but also demonstrated the impact of Africa-Europe collaboration in addressing environmental and public health challenges. Further partnership and policy support will be essential to expanding these solutions and maximizing their societal benefits.

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