LEAP-RE
PILLAR 1

October 3rd 2022

2021 Call projects kick-off meeting

LEAP-RE

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

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

Pillar 1 role: Implementing co-funded transnational Calls

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- Pillar 1 gathers **Research and Innovation funding Agencies** from Europe and Africa committed to **co-fund common Calls** constituying the Call Steering Committee
- Each funding Agency **dedicates some budget** to the Calls completed by a share of the **European Commission grant**
- Projects selected through the Calls are submitted by a **Consortium of R&I partners from both continents**
- Each Agency fund the partners of selected projects of its own country
- **Topics eligible** to the Calls are the 6 Multi-annual Roadmaps elaborated during Pre-LEAP-RE (Renewable resources, Stand alone systems, Mini-grids, End of life of equipment, Productive uses, Domestic uses)
- Pillar 1 is co-coordinated by ANR (France) and MESRS (Algeria)

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

16 European and African funding Agencies participating to the first Call (2021)

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Algeria		DG RSDT Directorate-General for Scientific Research and Technological Development ALGERIA البحث العلمي في خدمة المواطن
Egypt		أكاديمية البحث العلمي والتكنولوجيا Academy of Scientific Research & Technology
Morocco		ROYAUME DU MAROC Ministère de l'Education Nationale, de la Formation Professionnelle, de l'Enseignement Supérieur et de la Recherche Scientifique
		IRESEN Institut de Recherche en Energie Solaire et en Energies Nouvelles
Republic of South Africa		science & innovation Department: Science and Innovation REPUBLIC OF SOUTH AFRICA
		sanedi South African National Energy Development Institute
Togo		Université de Lomé

Belgium		fnrs LA LIBERTÉ DE CHERCHER EN TOUTE SÉCURITÉ !
Finland		SUOMEN AKATEMIA
France		AGENCE NATIONALE DE LA RECHERCHE ANR
		Nexa AGENCE RÉGIONALE DE DÉVELOPPEMENT D'INVESTISSEMENT ET D'INNOVATION
Germany		JÜLICH Forschungszentrum
Portugal		FCT Fundação para a Ciência e a Tecnologia
Romania		uefiscdi
Spain		CDTI
United Kingdom		Loughborough University

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2021 LEAP-RE Pillar 1 Call

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- 13 proposals selected for funding
- A global funding budget of 10 358 376 €, 8 428 086 € coming from funding agencies, 2 549 150 € coming from European Commission
- 82 partners in the 13 selected projects coming from 8 European countries and 9 African countries

→ UE: Belgium, France, Finland, Germany, Portugal, Romania, Spain, UK

→AU: Algeria, Egypt, **Ethiopia**, Morocco, **Mozambique, Nigeria**, South Africa, Togo,**Tunisia**

- Each country participating to Pillar 1 Call is involved in selected proposals funding
- 4 African countries without funding agency participating to the selected projects (budget dedicated : 618 860 €)

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

All European and African participating countries are involved in selected proposals

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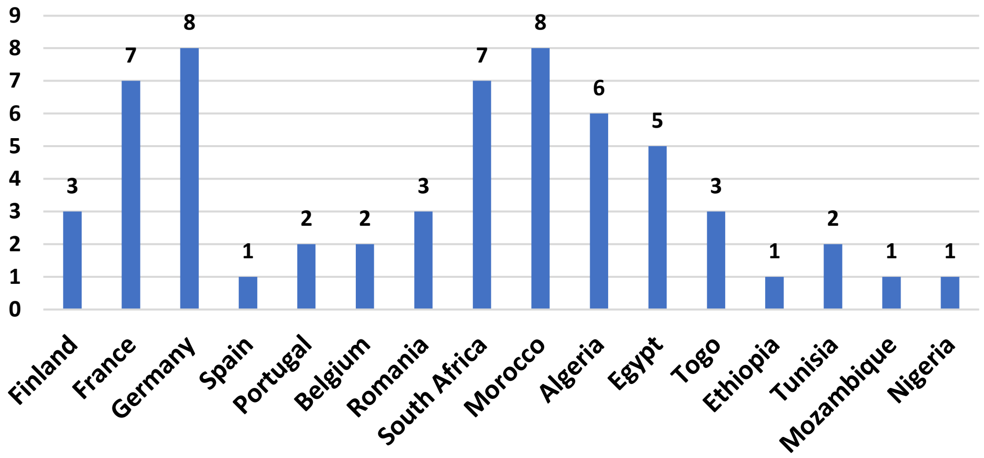
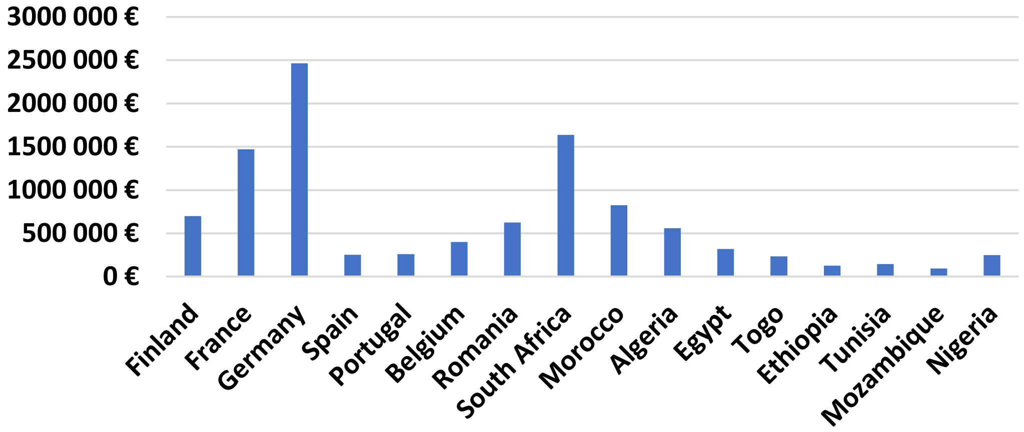
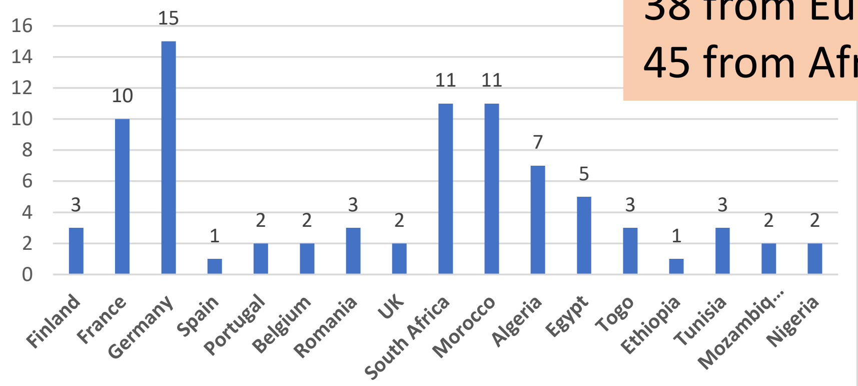
Number of proposals funded by country



Funding budget per country

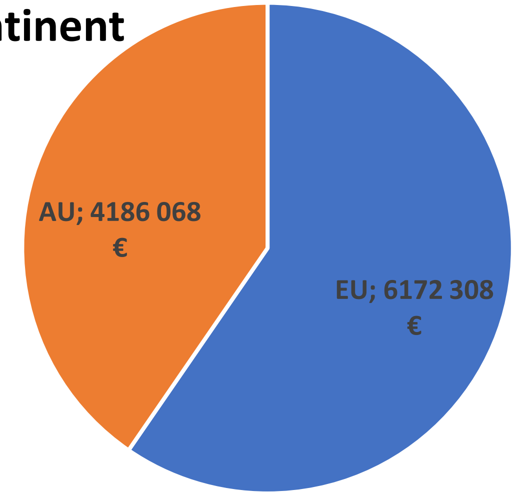


Number of partners / country



38 from Europe
45 from Africa

Budget/continent



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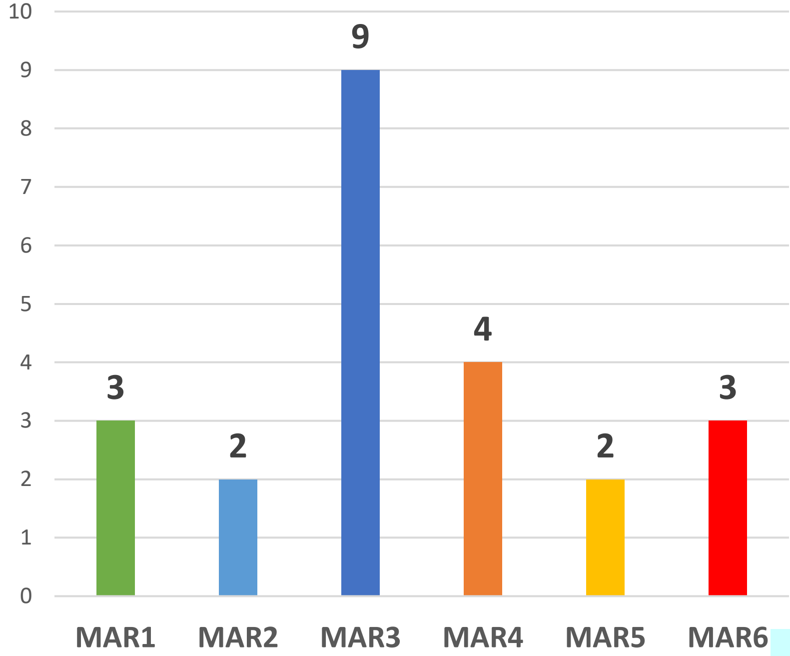
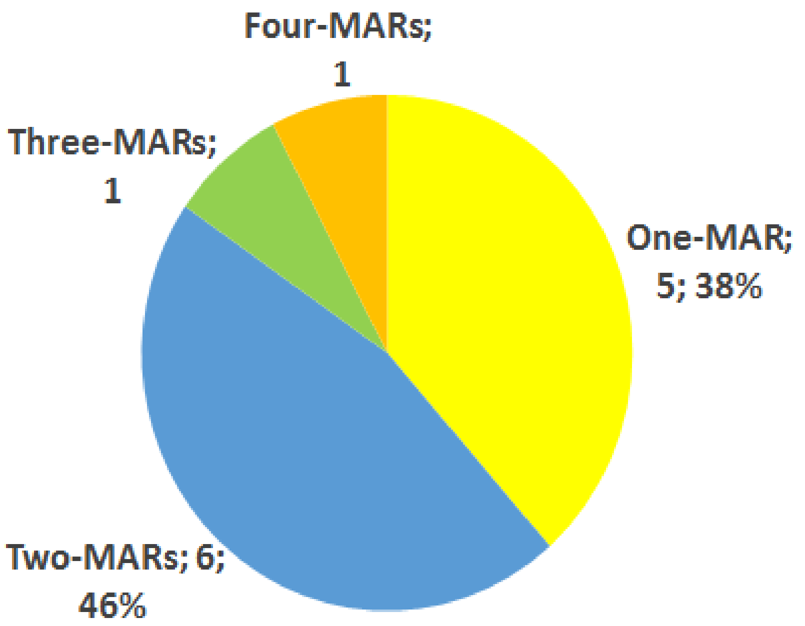
Brief synthesis on selected projects / Country

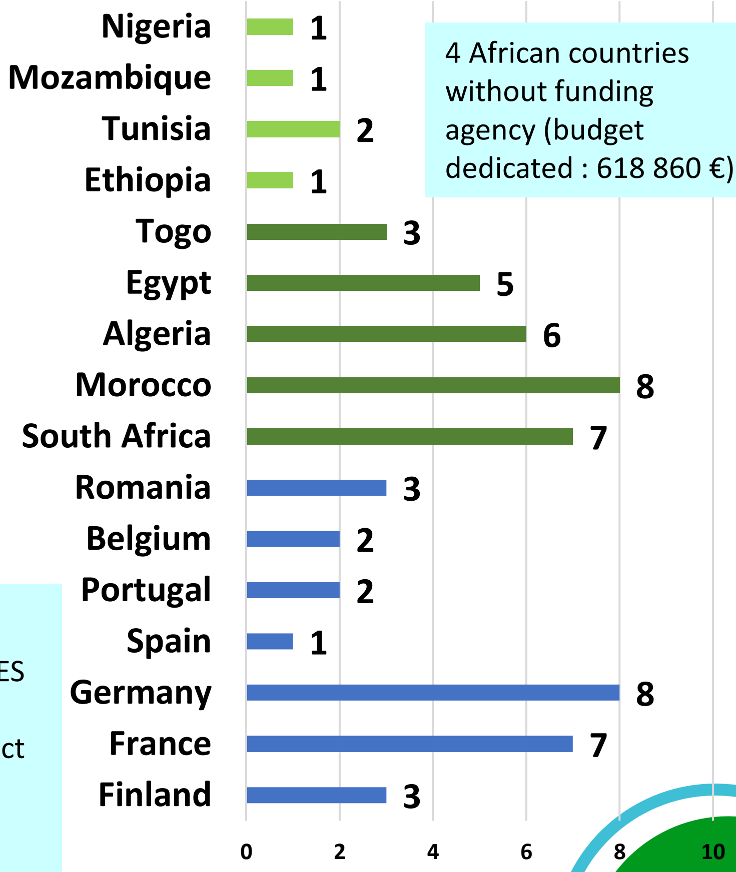
Distribution of projetcs/MARs



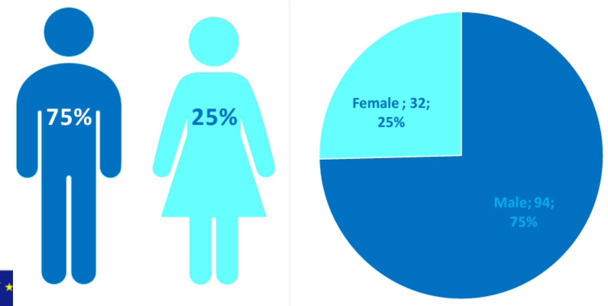
Frequency of MARs in Projects



Number of proposals funded by country



4 African countries without funding agency (budget dedicated : 618 860 €)



About the Multi-Annual Roadmaps

MAR#1. 1. Assessment of Renewable Energy Sources and integration of RES in sustainable energy scenario
MAR#2. End-of-life and second-life management and environmental impact of RE components:
MAR#3. Smart stand-alone systems (SAS)
MAR#4. Smart grid (different scale) for off grid application:
MAR#5. Processes and appliances for productive uses (PRODUSE)
MAR#6. Innovative solutions for priority domestic uses (modern energy for cooking and cold chain)

The LEAP-RE project has received funding from th ... ement 963530.

2021 Call : 13th selected proposals 1/2

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Renewable Energy Modelisation and scenarios

OASES	Development and Demonstration of a Sustainable Open Access AU-EU Ecosystem for Energy System Modelling

Renewable Energy technologies recycling and 2nd life

RESTART	REcycling of spent Li-ion batteries and end-life photovoltaic panels: From the development of metal recovery processes to the implementation of a START-up

SIREVIVAL	Si-based devices for renewable energy: From end of life recycling to revival of photovoltaic modules

Domestic Clean cooking and biomass transformation

SunGari	SunGari: A modern solar cooking solution for African staples

SoCoNexGen	Solar Indoor Cooking Systems of the Next Generation

SOLAR INDUCE	SOLAR INDUCEed domestic clean efficient cooking and refrigeration for off-grid applications in Africa

PyroBioFuel	Sustainable biomass conversion into bioenergy through pyrolysis

* Flag = project coordinator country

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2021 Call : 13th selected proposals 2/2

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New Renewable Energy for Africa

HyAfrica	**Towards a next generation renewable energy source – a natural hydrogen solution for power supply in Africa.**

New, more efficient PV cells

QDSOC	**Environmentally friendly colloidal quantum dots for high performance solar cells**

NANOSOLARCELL	**Integration of photonic conversion layers based on photoemissive nanostructured materials for improving sunlight harvesting ability of solar cells**

Productive uses and new applications of solar energy

MG-FARM	**Smart stand-alone micro-grids as a solution for agriculture farms electrification**

LEDSOL	**Enabling clean and sustainable water through smart UV/LED disinfection and SOLar energy utilization**

SolChargE	**Decentralized Solar Charging System for Sustainable Mobility in rural Africa**

* Flag = project coordinator country

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Stakeholders Forum Kick-off meeting objectives

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- Present each project to LEAP-RE community (projects and consortium identity, topics and key challenges addressed, outputs and outcomes expected, interest in clustering with other projects/partners…)
- Exchange and connect with LEAP-RE community (Pillar 2 projects coordinators, other stakeholders, Advisory Board, LEAP-RE Program Management Board) on projects
- Exchange on monitoring and evaluation process

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Second Call (2022) in process

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Algeria		DGRSDT Directorate-General for Scientific Research and Technological Development
Morocco		ROYAUME DU MAROC Ministère de l'Education Nationale, de la Formation Professionnelle, de l'Enseignement Supérieur et de la Recherche Scientifique
Republic of South Africa		science & innovation Department: Science and Innovation REPUBLIC OF SOUTH AFRICA
Austria		FFG Forschung wirkt.
Belgium		fnrs LA LIBERTÉ DE CHERCHER EN TOUTE SÉCURITÉ !
France		RÉPUBLIQUE FRANÇAISE anr agence nationale de la recherche
Italy		MUR
Germany		JÜLICH Forschungszentrum
Romania		uefiscdi

- Second Call was launched on July 9th 2022 (submission dead-line: September 23rd)
- 9 funding agencies from Africa and Europe committed to fund the Call
- 2 step process
- Final selection: March 2023

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Reporting of Pillar 1 projects (I)

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Evaluation is the systematic and objective assessment of an ongoing project, its implementation and its results. The objective is to determine the relevance and achievement of objectives, efficiency, effectiveness, impact and sustainability of development through regular monitoring of activities.

LEAP-RE – Pillar1 – Proposal of the template on projects reporting

A) Permanent data of the project

1) KEY DATA OF THE PROJECT

- a) Static information describing the project: Title, coordinator, partners, researchers, keywords, abstract, Version and date of the report
- b) Relevance to the LEAP-RE programme
- c) Link with the Multi-Annual-Roadmaps,
- d) Challenges addressed by the project,
- e) Expected Findings in relation with the MARs

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Reporting of Pillar 1 projects (II)

LEAP-RE

B) Dynamic data of the project

1) PROJECT PROGRESS (Reporting Period [One year])

- Project Progress
- Implementation Formats

2) **Description of work (preliminary results and milestones)**

3) Impact

Only for final annual report: Which impact do you think your project could contribute to after its end on a long-term perspective, both in terms of general (societal, economic, environmental) and call-specific (related to LEAP-RE Joint Call impacts?

4) Dissemination

5) Overview – PLANNED WORK

6) Financial progress

7) Any other comment

8) Electronic signature

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Agenda of 13 projects presentation

LEAP-RE

1. Renewable energy resources, mapping and modelling
OASES

2. End-of-life and second-life management of RE components
RESTART
SIREVIVAL

3. Clean cooking and biomass transformation
PyroBioFuel
SoCoNexGen
SOLAR INDUCE
SunGari

4. New renewable energy resources for Africa
HyAfrica

5. New, more efficient PV cells and components
QDSOC
NANOSOLARCELL

6. Productive uses and new applications of solar energy
MG-FARM
LEDSOL
SolChargE

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OASES

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

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OASES

LEAP-RE

Consortium

Project coordinator:

- Fraunhofer Institute for Energy Economics and Energy System Technology **(Germany)**

Project partners:

- Centre de Développement des Energies Renouvelables (**Algeria**)
- Helwan University (**Egypt**)
- VTT (**Finland**)
- University of Kassel (**Germany**)
- Council for Scientific and Industrial Research (**South Africa**)
- University of Venda (**South Africa**)

Further associated partners

Aim of the project

The overall project objective is the development and demonstration of an open and sustainable AU–EU ecosystem including a well-proven energy system modelling chain. The ecosystem will enable European and African scientists and energy system planners to perform and optimize national scenario analysis on their own. The idea of open source should pave the way to a long-term collaboration between AU and EU countries leading to further joint work in energy system modelling.

Relevance vs MARs

The project addresses MAR 1 (Mapping joint research and innovation actions for next-step development of RES and integration of RES in sustainable energy scenarios) in particular, but it also generates open data valid for MAR 3 (Smart stand-alone systems) and MAR 4 (Smart grid (different scales) for off grid application). With respect to MAR 1, technological development must be understood understanding and related to energy scenarios at the local, country, and global levels.

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OASES

LEAP-RE

Key challenges addressed by the project

1. Reliability and validation of the collected input data required for the open source energy Ecosystem model
2. The task challenges of developing the target open source energy ecosystem model that will be adopted interactively by EU-AFRICAN countries to analyze their relevant energy systems
3. Capacity building commitments by the project’s teamwork and the relevant dissemination and capacity building in the project’s partners

Expected results :

- ***Mid-term expected results (end 2023)***
  - *Approach for an easy-to-use energy scenario modelling workflow for different scales*
  - *Methods that enables the detection of wind turbine and PV system*
  - *Methods to generate high resolution time series for wind power and PV*
- ***End of project expected results (2025)***
  - *An easy-to-use energy scenario modelling workflow for different scales*
  - *Open Source Code that enables RES system detection and time series generation*
  - *Long-term open source and data strategy*
  - *Case studies on different spatial scales*
  - *Strengthening the RE long-term cooperation between Europe and Africa*

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OASES

LEAP-RE

Expected outcomes in case of success of the project (2030)

1. Researchers from different AU-UE country widely use the energy system modelling environment
2. Medium and long-term sustainable energy scenarios at different levels help policy makers to identify the best paths for the energy transition
3. Contribution to a paved way to AU-EU clean and sustainable energy policy and renewable energy partnership

Which main risks of failure during project implementation ?

1. Scinetific complexity (e. g. amount of data, Interfaces between modules of the ecosystem, complex local requirements)
2. Capacity building can not be done on-site due to external circumstances (permissions, uninterested trainee, CORONA Pandemics, rising travel costs)
3. New recruitment of staff: Shortage of skilled personnel in some countries

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OASES

LEAP-RE

Contribution of the project to AU – EU R&D cooperation

1. The open and modular modeling chain allows future collaboration and improvements not just from the consortium partners, but also from the wider energy and power system modeling community and hence allows to multiply the project sustainable cooperation. In addition, the ongoing collaboration between VTT and IRENA provides tools and support for developing countries worldwide pursuing higher shares of RES.

2. New business models in energy economy are often based on the interpretation of scenario analysis. Such interpretations allow ex-ante evaluation of business models with focus on external impacts like political decisions.

Interest of Consortium members in participating in LEAP-RE clustering activities

Serveral OASES partner would be very glad to join any active cluster in RE fields and in conjunction with the Multi Annual Roadmaps (MAR) specially MAR1, MAR3, and MAR4.

Helwan University is already a member in the first Egyptian Renewable Energy Cluster Initiative (ERECI) funded by the international fund agent (RDI)

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RESTART

RECYCLING OF SPENT LI-ION BATTERIES AND END-LIFE PHOTOVOLTAIC PANELS: FROM THE DEVELOPMENT OF METAL RECOVERY PROCESSES TO THE IMPLEMENTATION OF A START-UP

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

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RESTART

LEAP-RE

Consortium

Project coordinator:

- Ismael Saadoune
Cadi Ayyad University (UCA), **Morocco**

Project partners:

- King Salman International University (**Egypt**),

- Aalto University (**Finland**),

- Centre Européen de Recherche et d'Enseignement en Géosciences de l'Environnement - CEREGE (**France**),

- Cadi Ayyad University, Mohammed VI Polytechnic University - UM6P, and Green Energy Park (**Morocco**),

- Babeș-Bolyai University (**Romania**)

Aim of the project : *The main objective of RESTART Project is to implement a full value chain for recycling End-of-Life (EoL) LiBs and PV, shifting from linear economy to circular economy, thus reducing waste disposal as well as minimizing dependence on important primary materials. The specific objectives are :* ***collect ; recycle ; implement; coordinate***

Relevance vs MARs : RESTART project's deliverables are in accordance with the following outcomes and impacts of MAR 2:

- **Map of the EoL/OoS component value chain**
- **Proposal of methods for EoL/OoS component recycling**
- **Identification of second life components with a benefit for African countries**
- **Dissemination of acquired knowledge**
- **Creation of jobs**
- **Promotion of environmental and ecological sustainability**

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RESTART

LEAP-RE

Key challenges addressed by the project

1. Collection, disassembling and characterization of EoL LiBs and PV
2. **Technology Development and scale-up** of metals recovery processes
3. **Demonstration** of fresh Batteries build-up from recovered chemical elements
4. **Sustainability**: Life Cycle Assessment; assessment of Modules collection and handling protocols
5. **Economy Business** Plan based on the best cost performing recycling processes
6. **Dissemination** of the Project's outreaches for identification of key stakeholders
7. **Implementation** of a Start-up

Expected results :

- ***Mid-term expected results (end 2023)***
  - *Characterization, speciation of metals & products*
  - *Development of efficient metal extraction processes*
  - *Development of fresh LiBs and thermo-electrics*
- ***End of project expected results (2025)***
  - *Proof of concept, simulation & development of large-scale reactor*
  - *Analysis of Impacts: Life Cycle Assessment*
  - *Technico-Economic Assessment*
  - *Development of the Business Model*

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RESTART

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Expected outcomes in case of success of the project (2030)

What could be the impact of the project at 2030 on the economy and/or society in case of scaling up the results of the project ?

1. ***Creation of a startup devoted to recycling activities***
2. ***Possibility of replication in Africa***
3. ***Creation of Jobs***
4. ***Boosting the international visibility (recognition) of the consortium***
5. ***Promotion of environmental and ecological sustainability***

Which main risks of failure during project implementation ?

Describe the main risks identified for project implementation

1. ***Delays in or low quality of input from project partners (Discrepancy in the availability of funds by the funding agencies)***
2. ***COVID-19 pandemic affecting the ability of the consortium to deliver on the project objectives***
3. ***One or more partners leave the Project***
4. ***Scientific and technologic issues related to the project***

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RESTART

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Contribution of the project to AU – EU R&D cooperation

In term of reinforcement of scientific or innovation cooperation, capacity building…

- ***RESTART** concerns R&D activites in relation with **Climate change and sustainable energy***
- ***Capacity for joint research**: Complementary expertise to conduct high quality joint research*
- ***Scalability of R&I impact at national or regional scales:** RESTART implements a holistic approach that combines technical and business development that will ensure the scalability and replicability of the process*

Interest of Consortium members in participating in LEAP-RE clustering activities

- *Development of Li-ion Batteries starting from African Mineral resources,*
- *Some processes of e-waste recycling*
- *Co-supervision of PhD students (Energy Storage)*
- *Sharing the issues related to projects management (LEAP RE)*

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SIREVIVAL

Stakeholder Forum

3-6 October 2022

Pretoria, South Africa

Sorin MELINTE

sorin.melinte@uclouvain.be

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SIREVIVAL

LEAP-RE

Consortium

Project coordinator:

*- Université catholique de Louvain - UCLouvain (**Belgium**)*

Project partners:

*- Centre de Recherche en Technologie des Semi-conducteurs pour l'Energétique - CRTSE (**Algeria**),*

*- Université catholique de Louvain - UCLouvain (**Belgium**),*

*- CNRS, Institut d'Electronique, de Microélectronique et de Nanotechnologie - IEMN (**France**),*

*- École nationale supérieure d'ingénieurs de Tunis - ENSIT, and Centre de Recherche et des Technologies de l'Energie - CRTEn (**Tunisia**).*

Aim of the project

SIREVIVAL aims at the reduction of the environmental impact of spent photovoltaic (PV) modules. The effort is focused on the use of recycled materials, like Si, to build all solid-state supercapacitors and to integrate them with modern photovoltaic cells, in order to meet instantaneous power generation and delivery.

Relevance vs MARs

SIREVIVAL relies on interlinked chemistry, physics and engineering activities and is relevant for two multi-annual roadmaps: end-of-life and second-life management and environmental impacts of renewable energy components (MAR 2) and smart stand-alone systems to ease the access to energy in all its forms (MAR 3).

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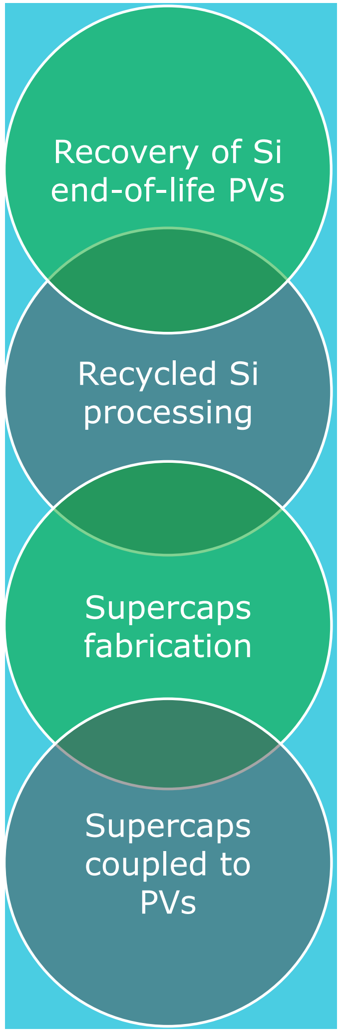
SIREVIVAL

Key challenges addressed by the project

1. *Material recovery from end-of-life PV panels with >85% overall efficiency*
2. *Ionogels with a large temperature operational window*
3. *Multi-stack architectures for all solid-state micro-supercapacitors, based on recycled Si, accommodating electrodes with controlled porosity and enhanced surface area*



Expected results

- ***Mid-term (end 2023)***

  Novel materials and architectures for all solid-state micro-supercapacitors

  Full recycling protocols for end-of-life photovoltaic panels

- ***End of project (2025)***

  All solid-state micro-supercapacitors built with recycled materials and integrated to photovoltaic modules

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SIREVIVAL

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Expected outcomes in case of success of the project (2030)

1. *Traceability of the PV panels across the full value chain (e.g. blockchain technology)*
2. *Smart methods to inspect PV panels (e.g. drones) to maximize productivity and collection of end-of-life PV panels (e.g. free of charge removal or relocation)*
3. *Automated, ultrafast processes of recycling*

Which are the main risks of failure during project implementation?

1. *Recovered Si is of inadequate quality to process materials for supercapacitors fabrication and integration*
2. *Operational parameters for the fabricated solid electrolytes, electrodes and encapsulation layers are not well controlled*
3. *Integrated supercapacitors to PV modules are not working properly.*

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SIREVIVAL

Contribution of the project to AU – EU R&D cooperation

Scientific cooperation and transfer of innovative practices in the energy sector

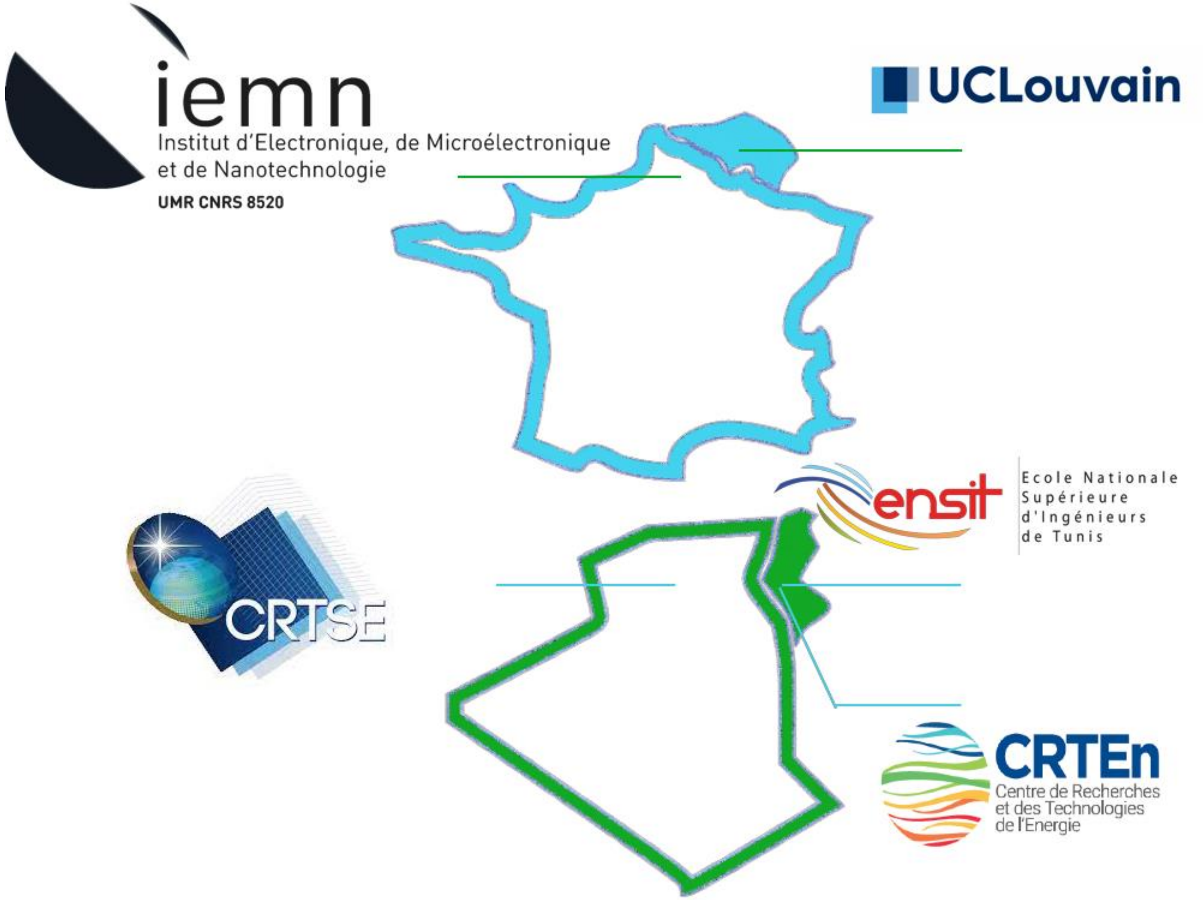
Capacity building and internationalisation of scientific activities

Interest of Consortium members for participating in LEAP-RE clustering activities: Methodology

Life Cycle Analysis modelling

On site experimentation in Africa

Aggregated datasets



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PYROBIOFUEL

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PyroBioFuel

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Consortium

Project coordinator:

- *Cairo University, Egypt*

Project partners:

- *Cairo University, Egypt*
- *Ibn Tofail University – Research Institute for Solar Energy and New Energies (IRESEN), Morocco*
- *Uni. Witwatersrand, South Africa*
- *Brandenburg University of Technology, Germany*
- *CNRS PIMM, France*

Aim of the project

Create a unique knowledge infrastructure that supports decentralized, sustainable, and cost-efficient conversion of biomass to sustainable fuels, relevant to both Europe and Africa

Relevance vs MARs

MAR3: Smart stand-alone systems

PyroBioFuel will design and validate innovative processing technologies, including a compact catalytic Fischer-Tropsch synthesis (FTS) reactor and hydrocracking (HCR) reactor that will increase the efficiency of the fuel conversion process

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PyroBioFuel

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Key challenges addressed by the project

1. *Increase availability of advanced biofuels and energy in the EU and Africa through reliable, inexpensive, stand-alone system architectures that can be easily deployed in off-grid rural and remote areas*
2. *Introduction of tailored technologies, using local renewable sources and for local use of population and economy*
3. *Strengthen European and African technology base and accelerate development of sustainable fuels to replace fossil alternatives*
4. *Development of technical and managerial competences and capacities in the area of biomass conversion and renewable energy generation*

Expected results :

- ***Mid-term expected results (end 2023)***
  - *Optimization of pre-treatment techniques for palm waste in Egypt and Morroco*
  - *Synthesis, characterization and optimization of highly efficient catalysts for FTS, HCR and bifunctional FTS-HCR at small-scale*
  - *Development of a combined experimental-modelling approach for the microchannel reactors for integrated FTS-HCR*
  - *Techno economic analysis and Life cycle assessment launch*
- ***End of project expected results (2025)***
  - *Optimization of pyrolysis process conditions at bench scale focused on products' quality along with characterization of pyrolysis products*
  - *Valorization of the produced biochar in wastewater treatment*
  - *Synthesis and characterization of highly efficient FTS-HCR catalysts at meso-scale, able to reach 70% conversion to fuel*

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PyroBioFuel

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End of project expected results (2025) (Cont'd)

- *Implementation of designed catalysts into MCR at lab scale*
- *Experimentation of pyrolysis at the micro-scale and at the laboratory scale accurate material/products balance and kinetics determined and with scaling laws for large scaling projects.*
- *Numerical modeling of the processes that will allow optimal cost, products output and efficiency calculation for life cycle analysis (LCA)*
- *Validation of the integrated biomass to fuel conversion technologies on pilot scale*
- *Techno economic analysis (TEA) and LCA for European and African case studies based on region specific feed-stocks, costings, and scale impact*
- *Socio-economic impact study of biomass pyrolysis*

- *Successful completion of 1 PhD thesis*
- *Successful completion of 1 postdoctoral training*
- *Submission of at least 8 publications to high-impact peer-reviewed journals*
- *Successful hosting of 5 workshops on:*
  - *"Showcasing modelling in the Bioenergy Industry"*
  - *"Use of hybrid FTS/HCR technologies in the Bioenergy Industry"*
  - *"Environmental and LCA assessment of biomass pyrolysis"*
  - *"Bioenergy Industry promoting Gender equity and SMEs development"*
  - *"Integrated PyroBioFuel technology"*

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

PyroBioFuel

LEAP-RE

Expected outcomes in case of success of the project (2030)

What could be the impact of the project at 2030 on the economy and/or society in case of scaling up the results of the project ?

1. ***Development of technology advances that significantly contribute to increasing the viability of advanced biofuels and energy in the EU and Africa through reliable, inexpensive, stand-alone system architectures that can be easily deployed in off-grid African rural and remote areas***
2. ***Wider availability of energy, reduced time collecting fuel, reduced home labour for women who can pursue other activities, health benefits of clean energy***
3. ***Carbon footprint and reduction of GHG emissions***
4. ***New market opportunities***

Which main risks of failure during project implementation ?

Describe the main risks identified for project implementation

1. ***Delay in the acquistion of the experimental setup***
2. ***Low performance of equipment*** *– Operation will be modulated to boost performance*
3. ***Required data not available from within the project, e.g., composition of the pyrolysis products*** *– Use of literature data and gases from bottles for catalyst development. Once data is available from partners, stability and efficiency of the catalysts will be tested*
4. ***Capital cost of the WP5 demonstrator is higher than estimated in the proposal*** *– Cost breakdown will be revised and presented to the PyroBioFuel partners for decision proposing to contribute to cover unforeseen costs for this crucial activity, proportionally to their budget*
5. ***Failure to develop suitable multifunctional FTS-HCR catalyst*** *– Use of noble-based metals or separate FTS and HCR microreactors*

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PyroBioFuel

LEAP-RE

Contribution of the project to AU – EU R&D cooperation

Exchange knowledge through targeted research activities between partners from the EU and Africa to develop the technology state-of-the-art, strengthen the European and African technology base and accelerate the development of sustainable fuels to replace fossil alternatives

Interest of Consortium members in participating in LEAP-RE clustering activities

- *Optimization of pyrolysis technologies for different feedstocks*
- *Combination of the microchannel reactors with other technologies for biomass valorization (e.g., gasification, anaerobic digestion)*
- *Use of microchannel reactors for the production of other types of energy carriers (e.g., hydrogen)*
- *Combination of PyroBioFuel technologies with renewable energy generation solutions*
- *Development of model-based decision-making tools to aid process assessment and increase operational efficiency, as well as through country-specific techno-economic studies and life cycle assessments for different feed-stock/product scenarios*

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

SOCONEXGEN

LEAP-RE

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

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

SOCONEXGEN

LEAP-RE

Consortium

Project partners:

- University of Applied Sciences (coordinator), Ingenieurbüro für Energie und Umwelttechnik, and low-tec gGmbH (Germany),
- Centre de développement des énergies renouvelables - CDER (Algeria),
- Universidade de Évora (Portugal),
- Université Mohammed Premier Oujda (Morocco),
- Université de Tunis El Manar- UTM (Tunisia).

Aim of the project

SoCoNexGen aims to develop secure, reliable, easy to use and environmentally friendly solar cooking technologies for domestic use. Four different solar indoor cookers with energy storage, powered by solar thermal collectors and/or PV panels, shall be built and tested.

Relevance vs MARs

The project “SoCoNexGen” addresses the challenge and scope of the MAR 6: “Innovative solutions for priority domestic uses (clean cooking and cold chain)” by developing a modern and sustainable solar cooker.

The LEAP-RE project has received funding from the European Union’s Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

SOCONEXGEN

LEAP-RE

Key challenges addressed by the project

1. Acceptance among the end users of the solar cookers (educate about cost savings on gas and firewood)
2. Replacement of stoves emitting unhealthy smoke and reducing danger of burning skin (e.g. children touching stoves) with solar solution
3. Relief for the population, especially in remote dry regions of North Africa with high solar irradiance
4. Reduction in time and effort primarily for women and children for collecting firewood (leads to a reduction in both deforestation and expansion of deserts)

Expected results :

- ***Mid-term expected results (end 2023)***
  - Functional tests completed in Germany for three cookers and functional test completed in Morocco
  - Shipment of three types of cookers from Germany to partners
  - Commissioning workshop in Tunisia
  - Four solar cookers installed in Morocco, Algeria, Tunisia and Portugal for testing
- ***End of project expected results (2025)***
  - User feedback from people testing cookers
  - Talks with a company for the production and distribution of the solar cookers
  - Standard testing procedure developed
  - Successful preparation of traditional dishes and food products with solar cookers and cooking flexibility with storage units
  - Dissemination workshops completed

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

SOCONEXGEN

LEAP-RE

Expected outcomes in case of success of the project (2030)

What could be the impact of the project at 2030 on the economy and/or society in case of scaling up the results of the project ?

1. Long term saving in fossil fuel costs if solar cooker is purchased
2. Relief to nature (less deforestation)
3. Relief to rural communities regarding reduction in pollution (smoke) from stoves
4. Education and relief of daily life with use of renewable energy system
5. Creation of an infrastructure in the construction and sale of solar cooking technology

Which main risks of failure during project implementation ?

Describe the main risks identified for project implementation

1. Lack of interest from test users of the solar cookers (due to tradition of e.g. using firewood) and / or industrial and / or other stakeholders
2. Long lead times for essential components during construction phase
3. Costs of solar cookers are too high for common people (will micro credits or other funding options be available for purchasing a solar cooker?)

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

SOCONEXGEN

LEAP-RE

Contribution of the project to AU – EU R&D cooperation

1. In the long term, creation of jobs, e.g. through the granting of manufacturing licenses to local companies in Africa
2. Education of people on the topic of solar cookers will lead to knowledge transfer and capacity building
3. Strengthening of collaboration between involved universities and companies
4. Dissemination workshops can lead to further collaborations

Interest of Consortium members in participating in LEAP-RE clustering activities

The SoCoNexGen consortium is interested to hear about the topics of the other LEAP-RE projects to see if, in the future, a collaboration in other fields is possible

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

SOLAR INDUCEed domestic clean efficient cooking and refrigeration for off-grid applications in Africa
SOLAR INDUCE

Javier Aranceta Aguirre
on behalf of
Project coordinator:
Jose Ignacio Mujika Odriozola,
COPRECI S Coop,
Spain

LEAP-RE

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

First Pillar1 Projects Meeting

22nd June, 2022

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

SOLAR INDUCE

LEAP-RE

Consortium

SOLAR INDUCE consortium comprises 7 partners from 2 European countries (UK and Spain), 2 African countries (Egypt and South Africa), with contributing agencies, and 2 African partners from Nigeria that don't have contributing agencies.

There is strong industry/commercial leadership and involvement in this consortium.

SOLAR INDUCE includes industry leader (COPRECI) and technological SME (SPG) with research performing capacity to contribute to technology push.

They are capacitated to contribute to the design and manufacturing effort and are also committed to commercialisation.

Each industry partner has clear expectations and commitments towards commercially using the results of this project in their businesses. This has been important for each industry partner for committing to co-funding this project. This commitment is a solid starting platform towards ensuring the exploitation of the results post-project.

Aim of the project

To develop and demonstrate innovative high-performance and cost-effective **solar off-grid cooking and refrigeration solutions** in African rural and remote communities, focusing upon **local** content of **manufacturing**, **materials**, and local population **employability**. The proposed technology will be **laboratory tested and** undergo **demonstrations** at an allocated site in Africa.

Relevance vs MARs

MAR 6 – Innovative solutions for priority domestic uses (clean cooking and cold chain)

In **Africa**, **700 million people lack access to clean cooking** [1]. In addition, in Africa nearly **40% of food perishes** before it reaches the consumer [2]. It directly impacts the livelihoods of many households and the local economy, on health centers, schools, and food production and storage.

[1] Access to clean cooking – SDG7: Data and Projections – Analysis – IEA, 2020.
[2] Food and Agriculture Organisation of the United Nations, 2020.

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement 963530.

SOLAR INDUCE

LEAP-RE

Consortium

Project coordinator:

- *Jose Ignacio Mujika*, COPRECI S Coop (**Spain**).

Project partners:

- *Sarah Khalil*, The British University in Egypt (**Egypt**).
- *Raymond Taziwa*, Walter Sisulu University (**South Africa**).
- *Patricia Popoola*, Tshwane University of Technology (**South Africa**).
- *Onyedika Aneke*, S&P Global Resources Nigeria Limited (**Nigeria**).
- *Paul Nnamchi*, Enugu State University of Science and Technology (**Nigeria**).
- *Ulugbek Azimov*, University of Northumbria (**United Kingdom**).

[1] Access to clean cooking – SDG7: Data and Projections – Analysis – IEA, 2020.
[2] Food and Agriculture Organisation of the United Nations, 2020.

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement 963530.

SOLAR INDUCE

LEAP-RE

Key challenges addressed by the project	*Expected results*

1. *To develop a system for domestic cooking that will be powered by free solar energy.*
2. *To develop an effective refrigeration cycle powered by solar energy during the day and through passive refrigeration overnight.*
	➢ *Helping to protect women and children form collecting biomass for cooking and becoming ill due to respiratory problems.*
	    ➢ *Pilot in Nigeria*
	➢ *The main aim of this innovation will be to reduce the actual food losses (by more than 80%), increase food producer/retailer incomes (by 30%) and reduce food spoilage and poisoning.*
	    ➢ *Pilot in Egypt*

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

SOLAR INDUCE

LEAP-RE

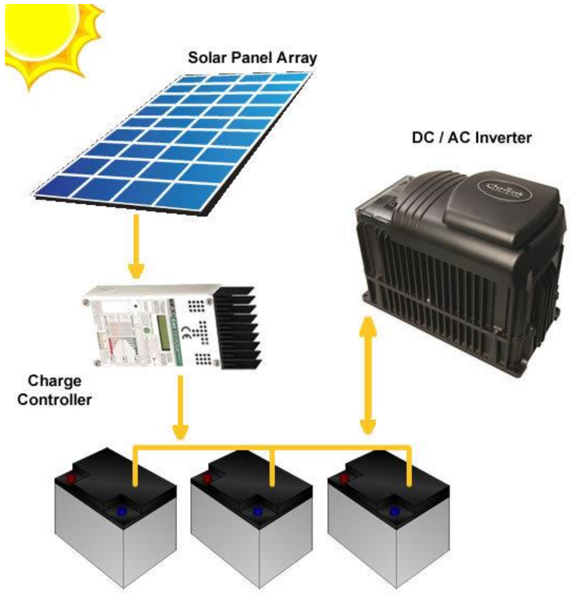
Key challenges addressed by the project	***Expected results***
1. *To develop a green cooking solution based on induction technology that is more efficient, more economical and more robust, to enable its powering by solar panels and its deployment in rural settings in Africa.*	➢ *A fully functional induction cooker with a 10 % efficiency improvement* ➢ *A cookware retrofit solution to enable the use of traditional cookware.* ➢ *A local demonstration pilot in Nigeria to assist in the dissemination and promotion of this technology.*

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

SOLAR INDUCE

LEAP-RE

Piloting:



Clean cooking

Milestone:

- Demonstrate solar induction cooking system
- Ako-Nike community (Nigeria)

Refrigeration system

Milestone:

- Solar refrigeration based on natural hydrogels from local mucilage (Cacao and Dika nut)
- Demonstration in Egypt

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

SOLAR INDUCE

LEAP-RE

Expected outcomes in case of success of the project (2030)

1. ***Economic:***
   1. *SOLAR INDUCE is estimated to create more **than 30 direct jobs** directly on the pilot sites.*
   2. *It will also create **jobs indirectly** by increasing business operation hours through income generation from the energy solutions, energy cost savings or less time spent on cooking.*
   3. *By assisting communities to expand electricity-powered productive activities, a virtuous cycle will be created in which electricity consumption will increase alongside increasing household incomes.*
   4. *The final element of this virtuous cycle is that increased consumption will eventually allow companies to reduce electricity prices.*
   5. *The project will **help communities expand** renewable electricity-powered **cooking activities**, which will reduce expenses for collecting charcoal and firewood, as free solar energy will always be available.*
2. ***Environment:***
   1. *SOLAR INDUCE will make an impact on **reducing GHG** emissions, as a result of the replacement of inefficient fuel production and consumption, by renewable solar energy,*
   2. *It will help **preventing forest degradation** and deforestation due to fuel collection and production,*
   3. *and **improving agricultural productivity** as a result of preventing habitat degradation and combustion of dung as fuel.*
3. ***Creation of new market opportunities for both EU and African companies on the African continent***
   1. *By the provision of electricity and electrical equipments, SOLAR INDUCE will lay the ground for the development of many electricity-powered cooking businesses such as for agriculture (food dryers, incubators, etc.), food industry (catering, restaurants, community dining, etc.), and social (education, health devices, etc.).*
   2. *In addition, the mini-grid and off-grid solar systems as well as induction cooking will pave the way for partnerships **between local and international firms.***

Which are main risks of failure during project implementation ?

1. *Receiving authorisation for demonstration will take more time and will put the project at risk*
2. *Security clearances of some countries may delay the timings*
3. *Technical risks:*
   1. *Induction efficiency, suitability of materials, electromagnetic matching.*
   2. *Optimisation of absotion refrigeration design*
   3. *Synthesation of natural and synthetic hydrogels with desired physical properties.*
4. *The economic and environmental conditions and impacts associated with future mass production of natural hydrogels for solar refrigeration*

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

SOLAR INDUCE

LEAP-RE

Contribution of the project to AU – EU R&D cooperation

- The project will improve the international EU-Africa cooperation by creating liaisons with green energy sector-related stakeholders from renewable energy and clean cooking and refrigeration solution providers, SMEs, technology suppliers, energy professionals and policymakers. The network will extend to potential investors and finance organisations.
- The close collaboration, know-how, and knowledge transfer between EU-African partners envisaged in project work packages will strengthen the visibility of EU Cooperation, Partnership and Diplomacy actions in Africa.
- It is hoped that the collaboration between universities and technology centres will be strengthened and that it will last beyond this project and become a regular feature.

Interest of Consortium members in participating in LEAP-RE clustering activities

Not yet discussed in depth, but…

1.-Mapping joint research and innovation actions for future RES development – Consolidation of detailed map of R&I initiatives in Europe and Africa per technology, application etc. type with the aim to support the RE industry to prioritize and contextualize target areas of RES deployment

2. **End-of-life and second-life management and environmental impact of RE components** - Map the component value chain, identification of key stakeholders & successful business models promote replicability scenarios of operational models and standard operating procedures in concerned regions

3. **Smart stand-alone systems (SAS)** - Promote the development of RE-SAS demonstrator(s) considering the diversity of potential local RE sources and the local effective environment

4. **Smart grid (different scale) for off grid application** - Development of new tools for optimizing capacity in planning and dispatching strategies based on people's needs with the aim to reduce the energy dependence on fossil fuel and increasing the share of RES use including electricity storage solutions such as batteries, hydrogen…

5. **Processes and appliances for productive uses (PRODUSE)** – Improvement and Promotion of wider use of PRODUSE appliances for Cold chain and thermal tools and equipment's (healthcare and agriculture - livestock, fisheries and farming)

6. **Innovative solutions for priority domestic uses (clean cooking and cold chain)** - Improving, managing and maintaining solar photovoltaic systems, cookstoves and cold chain components for clean cooking and food storage. Supporting interactions with policymaking to foster fast market uptake considering the macro socio-economic and gender impacts

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

SUNGARI

LEAP-RE

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

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

SunGari

LEAP-RE

Consortium

Project coordinator:

- Parmar, Natural Resources Institute, University of Greenwich, **UK**

Project partners:

- University of Kassel, and Simply Solar Technology Consulting GbR (**Germany**),
- University of Pretoria, and University of Limpopo (**South Africa**),
- University of Lome (**Togo**),
- University of Greenwich (**UK**)

Aim of the project

The SunGari project aims to **develop Modern Energy Cooking Service (MECS) based on solar cooking** (PV and CSP) for **Gari processing** in West Africa.

The technological approach will be **highly scalable and transferable** to other countries in the region to process different staple food based on maize, yam, plantain, and sweet potato.

Relevance vs MARs

MAR 5: Pocesses and appliances for productive uses (agriculture and industry). **Rural industries' productivity** and **socio-economic development of communities** that live in off or poor grid connectivity.

MAR 6: Innovative solutions for priority domestic uses. The project will provide safe and efficient cooking services at the domestic and SME level.

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

SunGari

LEAP-RE

Key challenges addressed by the project

1. *More than **700 million people in Africa** do not have access to modern energy cooking services.*
2. *Almost **all the Gari produced in West Africa relies on** firewood or fossil fuels at the household and small enterprise level.*
3. *The project will help reduce the **drudgery** for girls and women and improve their opportunities, social-economic power, and health outcome.*
4. *Reduction in GHGs, deforestation and land degradation.*
5. *Affordable and Clean Energy for all.*

Expected results :

- ***Mid-term expected results (end 2023)***
  - *Three (3) test units (Solar-powered gari roasting set up constructed and installed at demo sites in Togo.*
  - *Local gari processors and the cassava processing equipment manufacturer capacity building workshop completed.*
  - *SunGari startup established at the business incubation center at the University of Lome, Togo*
- ***End of project expected results (2025)***
  - *Individual and public health improved. Improved health and wellbeing (respiratory illness)*
  - *New employment creation and increased productivity of rural industries*
  - *Local capacity building (in Africa) and awareness of clean energy.*

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

SunGari

LEAP-RE

Expected outcomes in case of success of the project (2030)

What could be the impact of the project at 2030 on the economy and/or society in case of scaling up the results of the project ?

1. **Increased productivity in the informal sector.**
2. **Food preservation and reduced post-harvest losses.**
3. **GHG emission, local pollution, and deforestation reduced.**
4. **Drudgery of girls and women reduced.**
5. **Individual and public health improved.**
6. **Employment creation. Income generation**

Which main risks of failure during project implementation ?

Describe the main risks identified for project implementation

1. ***Resource Risk: Financial (reduced budget, increase in material costs etc).***
2. ***Resource Risk: Human resource risk, for example, one of the partners not cooperating or leaving the consortium.***
3. ***Managerial risk: Lack of communication, émergence of conficts among the design and development team and other stakeholders.***

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

SunGari

LEAP-RE

Contribution of the project to AU – EU R&D cooperation

- *Introducing an efficient, scalable, and transferrable solar device for Gari making and **supporting the transition of African economies to be low carbon and climate resilient**. Leapfrogging the use of fossil fuel in the industry concerned.*
- ***Renewable energy systems to support economic growth** and development in Africa.*
- *The **collaboration between African and European scientific communities**.*
- ***South- South cooperation**, via technical contribution and exchange of expertise among African partners (South Africa and Togo).*
- ***SDG (Sustainable Development Goal) 7**.a - enhances international cooperation to facilitate clean energy research and technology access, including renewable energy.*

Interest of Consortium members in participating in LEAP-RE clustering activities

- **MAR 5**: which relates to processes and appliances for productive uses (agriculture and industry).
- **Rural industries' productivity** and help improve the **socio-economic development of communities** that live in off or poor grid connectivity (as SunGari devices will have a total off-grid operation).
- **MAR 6**: which is related to Innovative solutions for priority domestic uses.
- Safe and efficient solar cooking at the domestic and small, and medium enterprise (SME) level for Gari roasting.

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

LEAP-RE

Gari Processing in Togo

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

HyAFRICA

Natural hydrogen exploration in africa

Júlio Carneiro
Converge!, Lda

Stakeholder Forum
Pretoria, 3/10/2022

LEAP-RE

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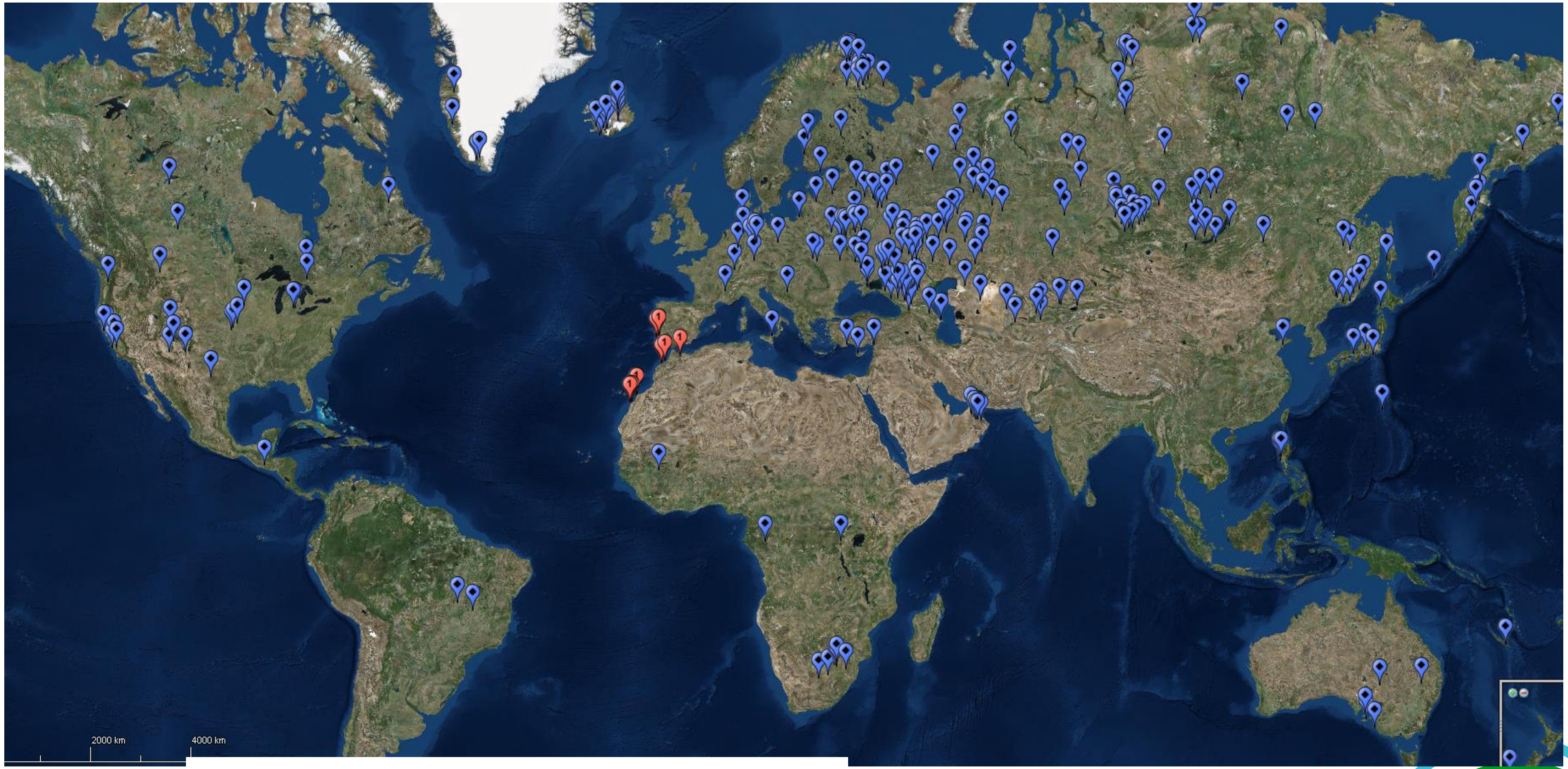
HyAfrica

So, what about natural hydrogen?

Source: Omar Maiga (2022)



Natural hydrogen in concentrations >10%

Natural hydrogen discoveries Converge!

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HyAfrica

LEAP-RE

Consortium

One SME (coordinator), 2 research institutes, 5 universities and 1 governamental regulatory body.

Portugal	CONVERGE! I&D Geo-energia e Geofísica	
Germany	LIAG Leibniz Institute for Applied Geophysics	Fraunhofer IEE
Morocco	Université Mohammed Premier	
Mozambique	Universidade Eduardo Mondlane	DNGM Moçambique
South Africa	University of Pretoria	University of Limpopo
Togo	Université de Lomé	

Aim of the project

- Map **natural hydrogen resources** in target regions of Morocco, Mozambique South Africa, Togo.
- Socio-economic impact assessment and business models in standalone and off-grid systems.
- Regulatory and roadmap actions for target countries to engage on natural hydrogen exploration and utilisation.

Relevance vs MAR#3 and MAR#4

- Natural hydrogen is a constant energy source – reliability of power supply
- Local source of energy to isolated communities in stand-alone and off-grid systems
- Reduces energy costs and develops local economies by creating job opportunities.
- No GHG – water is the only by-product. Unlike green H_2, natural H_2 reduces energy-water competition.

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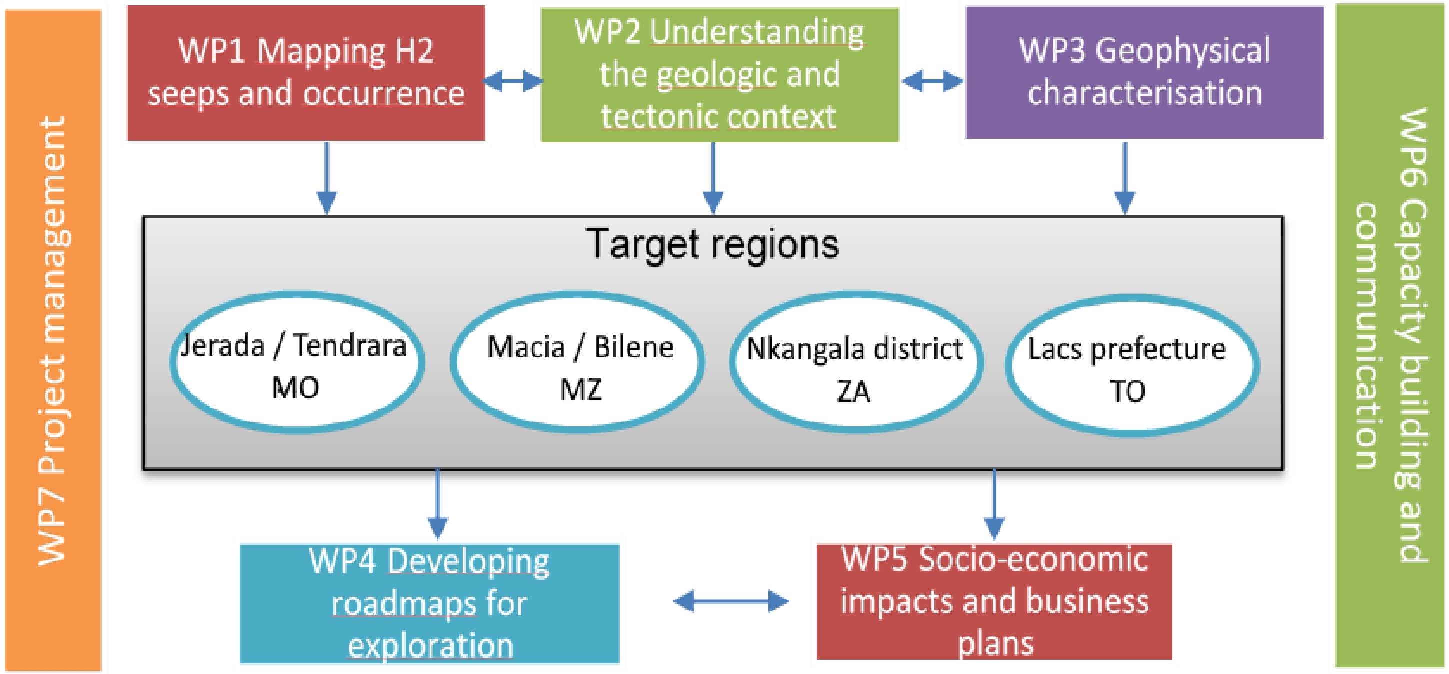
HyAfrica

LEAP-RE



Methodological approach

Geological and geophysical research - WP1, WP2, WP3

Policy and regulatory analysis – WP4

Research on local energy systems and their economics - WP5

Capacity-building strategy - WP6

Local Teams characterise each region

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

HyAfrica

LEAP-RE

Key challenges addressed by the project

1. High level of uncertainty on natural hydrogen resources required for local / regional energy systems;
2. Exploration methodologies for natural hydrogen are poorly defined;
3. No regulatory measures are in place;
4. Lack of studies on social-economic impact or business model;
5. Technical capacity and awareness about natural hydrogen is very low, even among the geosciences community.

Expected results :

- **_Mid-term expected results (end 2023)_**
  - Identification of natural H_2 resources in 4 regions;
  - Methodology for exploration of natural hydrogen;
  - Capacity building and raising awareness among stakeholders of target countries.
- **_End of project expected results (2025)_**
  - Roadmaps for exploration and exploitation in target countries;
  - Techno-economic analysis of natural H_2 in energy system of two most promising regions;
  - Business models for natural H_2 utilization at local and regional level for 4 regions;
  - Complementarity of natural H_2 and green H_2 and other RES for 2 promising regions.

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HyAfrica

LEAP-RE

Expected outcomes in case of success of the project (2030)

Regional scale

1. At least 2 regions implement natural H_2 exploration and utilisation programmes;
2. At least 2 regions increase the share of RES and promote sustainability by using natural H_2;
3. Business models for standalone systems with H_2 (natural or green) are validated in the target regions;
4. Communication at local and regional level increase local populations engagements.

Country scale

1. At least 2 countries include natural H_2 in the national mining and energy laws;
2. At least 2 countries implement programs for characterisation of national resources in natural H_2.

Which main risks of failure during project implementation ?

1. Insufficiency of geological or geophysical data.
2. Limited commercial viability of the use cases (not enough H_2 resources, cost of infrastructure, …);
3. Difficulty to engage regional / national policy makers and stakeholders to develop regulatory frameworks;
4. Difficulties in collecting data about local energy systems and for socio-economic analysis;

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

HyAfrica

LEAP-RE

Contribution of the project to AU – EU R&D cooperation

1. African and Europe researchers involved in new industrial branch on an hydrogen base economy,
2. Europe's competitive edge in an innovative technology, and Africa a competitive advantage on the availability of H_2 resources.
3. Reinforced joint African and European scientific basis and export potential for a new primary energy source.
4. Europe and Africa as frontrunners in the natural hydrogen industry and provide EU and African companies the opportunity to lead its exploration, exploitation and purification.

Interest of Consortium members in participating in LEAP-RE clustering activities

1. Connection to MAR#1, MAR#3 and MAR#4.
2. Capacity building for public officers and institutional representatives
3. Acquisition of data on socio-economic conditions, energy semand and energy supply
4. Socio-economic modelling
5. Resource availability and energy supply chain.

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

HyAfrica

LEAP-RE

Casablanca 15 and 16 September
Workshop on Natural Hydrogen and field trip

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

HyAFRICA
Natural hydrogen exploration in africa

THANK YOU

LEAP-RE

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

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

Environmentally friendly colloidal quantum dots for high performance solar cells

QDSOC

LEAP-RE

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

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

QDSOC

LEAP-RE

Consortium

Project coordinator:

- Raphaël Schneider, Université de Lorraine, **France**

Project partners:

- University of Liege (**Belgium**),
- Université de Lorraine (**France**),
- Mohammed V University in Rabat (**Morocco**),
- Mohammed VI Polytechnic University (**Morocco**)
- University of the Witwatersrand (**South Africa**)

Aim of the project

● Develop new QDSSCs using heavy metal-free QDs as absorbing material in the visible and infrared regions for optimal use of the solar spectrum.

● Optimize the interface between Ag-In-Zn-Se or $CsSnX_{3-x}Y_x$ QDs and the TiO_2 photoelectrode using wet and vacuum deposition processes.

Relevance vs MARs

● Find new materials and better design PV cells to **make more efficient solar panels and decrease their cost for generating clean and renewable electricity**.

● Develop devices that will **allow not only autonomous but also decarbonated production of electricity and thus ensure energy independence.**

The LEAP-RE project has received funding from the European Union’s Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

QDSOC

LEAP-RE

Key challenges addressed by the project

1. Develop new syntheses of Ag-In-Zn-Se and $CsSnX_{3-x}Y_x$ QDs with optimal electronic and optical properties for use in QDSSCs.
2. Optimize the structure and the electronic properties of the dense TiO_2 layer via magnetron sputtering and of the porous TiO_2 layer by wet-based templating strategies.
3. Control the microstructure of the TiO_2 porous network, in order to form continuous and highly condensed interpenetrating nanochannels allowing to maximize QDs to TiO_2 charge injection and minimize recombination.
4. Establish the excited state and charge transfer properties of Ag-In-Zn-Se and $CsSnX_{3-x}Y_x$, as well as their interaction with TiO_2 to further boost the QDSSCs efficiency.

Expected results

- Achieve **power conversion efficiencies (PCEs) above 15%,** which constitutes a ground-breaking challenge for heavy metal-free PV cells.
- **Place Africa and Europe at the forefront of renewable energy technologies worldwide** and **enable market breakthrough**, notably through the development of tailored materials exhibiting high efficiency in the solar spectrum region and their optimized integration with the other solar cell components to assemble highly efficient QDSSCs.
- **Develop reliable stand-alone system architecture that can be easily and widely deployed in off-grid African rural and remote areas.**

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Expected outcomes in case of success of the project (2030)

1. Develop new materials, better design PV cells to make more efficient solar panels and lower the cost of generating clean and renewable electricity.
2. Enable the development of devices that will allow both autonomous and decarbonated production of electricity and thus ensure energy independence.
3. Engineering of reliable stand-alone system architecture that can be easily and widely deployed in off-grid African rural and remote areas.
4. This collaborative research will sustain significant progress towards a highly efficient, large scale, low-cost and flexible PV cells solution.

Which main risks of failure during project implementation ?

1. Problems to engineer adequate TiO_2/QDs interfaces (deterioration of morphological and/or optolectronic properties).
2. 15% PCE is not reached for the solid-state QDSSCs.
3. Optoelectronic properties changes over the cell area, risks related to the assembly of the full QDSSCs stack.
4. Drop of the PCE when increasing the device size from <2 cm^2 to 25 cm^2.

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QDSOC

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Contribution of the project to AU – EU R&D cooperation

- *Solar-powered electricity production will become a major industry worldwide. Thus, it is important for Europe and Africa to develop their R&D capacity in this field and position their academic research as world leading to ensure that companies choose Europe and Africa as a location for R&D and manufacturing for the future clean electricity production.*
- *The project involves young researchers allowing them to develop future leadership (3 PhD students recruited by the French, Moroccan and South African partners and also Master students).*
- *Search for other financial support (Hubert Curien program (France, Morocco, South Africa, Belgium), CNRS PEPS program (France), WBI (Belgium), FNRS (Belgium) to promote the mobility of researchers between the different teams and develop new collaborations.*

Interest of Consortium members in participating in LEAP-RE clustering activities

QDSOC is focused on the synthesis of nanocrystals and on the architectural design of TiO_2 layers for the development of QDSSCs.

All consortium members are open to sharing knowledge and developing new projects.

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NANOSOLARCELLS

LEAP-RE

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

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

NanosolarCELLS

LEAP-RE

Consortium

Project coordinator:
- Conchi Ania (*aka* Maria Concepcion Ovin Ania), CNRS-CEMHTI, **France**

Project partners:

- Unité de Développement des Equipements Solaires, UDES (**Algeria**)

- Mansoura University, MU-EG, (**Egypt**)

- Cadi Ayyad University, IMED (**Morocco**)

- Gheorghe Asachi Technical University of Iaşi (**Romania**).

Aim of the project

NANOSOLARCELLS aims to increase the efficiency of conventional photovoltaic solar cells by incorporating photonic down-conversion layers based on photoemissive nanostructured materials (carbon nanostructures and polymers). Such photonic layers are capable of harnessing such UV fraction of sunlight and can be easily implemented on existing PV cells. We expect and overall conversion efficiency increase between 2-3%, due to a better exploitation of the solar spectrum.

NANOSOLARCELLS will integrate these materials in electrodes of large dimensions to evaluate the performance in real conditions (outdoor illumination). The materials will be tested for durability in aggressive environmental conditions in African countries.

Relevance vs MARs

NANOSOLARCELLS focuses on Topic 1 "Mapping joint research and innovation actions for next-step development of RES and integration of RES in sustainable energy scenarios" of Pillar 1 within PRE-LEAP-RE. We propose to develop a sustainable and endogenous system for renewable electricity production based on the conversion and efficient harvesting of solar UV photons by means of radiative processes occurring in photoemissive materials.

The challenge is to integrate theses up-conversion layers in existing solar cells, optimizing the parameters of sustainability, effectiveness, and performance in aggressive environments (e.g., stress imposed by high UV radiation high temperature, atmospheric pollutants, rain, dust, wind, etc).

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NanosolarCELLS

LEAP-RE

Key challenges addressed by the project

1. Solar UV photonic down-conversion based on photoemissive materials.
2. Establish the best operative parameters of photonic conversion layers to incorporate them on current layout of commercial solar cells
3. Assure low cost of the photonic conversion layers (based on local precursors)
4. Exploring aging mechanisms as a function of exposure to UV radiation,
5. Durability of devices in aggressive environmental conditions (e.g., dust, high level of irradiation) in African countries.

Expected results :

- **Mid-term expected results (end 2023)**
  - *To achieve at least 3% increased efficiency of hybrid solar cells*
  - *To construct a prototype of hybrid solar cells for long-term operation and validation of the approach*
  - *To contribute to train young researchers in a multidisciplinary environment (joint PhD thesis; exchange of masters & postgraduates)*
- **End of project expected results (2025)**
  - *To achieve at least 10 % increased lifetime*
  - *To achieve al least 5 % reduced cost of solar energy or solar module*
  - *To improve the stability of the cells in outdoor conditions and harsh environments compared to conventional cells.*

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NanosolarCELLS

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Expected outcomes in case of success of the project (2030)

What could be the impact of the project at 2030 on the economy and/or society in case of scaling up the results of the project ?

- *To achieve at least 10 % increased lifetime of solar cells with the coating layers*
- *To achieve al least 5 % reduced cost of solar energy of solar modules with our coating layers.*

Which main risks of failure during project implementation ?

Describe the main risks identified for project implementation

1. *Low down-conversion efficiency of the nanostructured materials to be used in the coating layers*
2. *Coating layers are not stable/compatible with electrodes of solar cells*
3. *Incorporation of the active materials in the coating layers do not significantky reduce the cost of solar modules*

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NanosolarCELLS

LEAP-RE

Contribution of the project to AU – EU R&D cooperation

Innovation: provide new solutions to exploit the enormous energy potential in Africa

Capacity building: (i) skill transfer through training of personnel; (ii) favoring the use of local renewable sources (local circular economy).

Cooperation: know-how share: towards energy transition in Europe and Africa, providing energy access in isolated areas.

Interest of Consortium members in participating in LEAP-RE clustering activities

Which thematic (MARs technologies…) or methodology (modelling, on site experimentation…) members would be interested to share with other LEAP-RE projects ?

Topic 1: Mapping joint research and innovation actions for next-step development of RES and integration of RES in sustainable energy scenarios

Topic 3: Smart stand-alone systems

The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

Smart microgrids as a solution for agriculture farms electrification

MGFARM

Project coordinators:
Lotfi BAGHLI, Serge PIERFEDERICI
Université de Lorraine,
France

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LEAP-RE

Consortium

Project coordinators:

- Lotfi BAGHLI, Serge PIERFEDERICI, Université de Lorraine, **France**

Project partners:

- Université de Tlemcen, and CDER-UDES (**Algeria**),
- IECORP SA, and Université de Lorraine (**France**),
- TUB-WIP (TU Berlin), TUB-EET (TU Berlin), and MicroEnergy International GmbH (**Germany**),
- Ecole Nationale des Sciences Appliquées d'Oujda, Green Energy Park, and International University of Rabat (**Morocco**)

Aim of the project

Development of smart microgrids based on Renewable Energy System (RES) to support the sustainable development of energy, water and agriculture sectors.

Based on the load profile and storage strategies of modern and sustainable agricultural practices, the system serves typical requirements such as pumping, irrigating, and cooling.

Relevance vs MARs

The installed Digitized RE Microgrid & Smart Storage Systems will have a measurable impact on MAR 1 by contributing to the development of a data-based research and education framework for the integration of smart grids (MAR 4) in the MENA region. Experimented results and enhanced local capacities on how the Digitized RE Microgrid & Smart Storage Systems will enable the connected farms to increase their production, save water and energy, contributing this way to MAR 5.

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Key challenges addressed by the project

1. Plug&Play concept of microgrids that can be connected or disconnected without intervention or changes to manual settings.
2. Energy management and dynamical stability are keystones of distributed microgrid systems.
3. Set-up AI, IoT and smart metering for data monitoring and blockchain technology to code the energy-packet transactions.
4. Validations of power electronics topology, its smart storage and energy management systems (TRL4 in UL and TUB).
5. On-site (Algeria, Morocco) validation under real conditions (TRL6) in farms and dwellings.

Expected results

- ***Mid-term expected results (end 2023)***
  - Setting up the Data Collection and Analysis Framework.
  - Analysis of the energy, water and agriculture policies and strategies in Algeria and Morocco.
  - Modelling and designing the optimized energy, water, and material flow within the farm.
- ***End of project expected results (2025)***
  - Designing the prototypes, the microgrid, the battery, and the data interface.
  - Procurement and installation of equipment for storage and microgrid, including data monitoring equipment.
  - Training of data collectors, farmers and microgrid users.
  - Monitoring of water, energy consumption and agricultural production in the farms.
  - Communication and stakeholder engagement.
  - PhD co-supervision (3 PhD thesis), writing journal papers, participate in international conferences.

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Expected outcomes in case of success of the project (2030)

1. Baseline study on the agricultural practices and the socio-economic environment of the participating farms. Data will be analysed using appropriate simulation models for the purposes of extrapolation.
2. Improvement of food and energy security
3. Growth of agricultural exports
4. Provide a new prosumer-type energy production and consumption model at the nexus of energy-water-agriculture and digitalization in rural areas

Which main risks of failure during project implementation ?

1. On-site procurement can be an issue
2. PhD student recruitment failure due to ZRR (Restricted Regime Zone), Visa issue, and/or salary because of co-supervision and local policies
3. Local energy policies not allowing grid connexon and tests of the prototypes

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Contribution of the project to AU – EU R&D cooperation

- Capacity building: Training of data collectors, farmers and microgrid users
- Research cooperation between France, Germany, Algeria and Morocco: Common work, PhDs co-supervision, development of prototypes and test benches
- Building new relationship and research partnership between AU and EU labs and universities

Interest of Consortium members in participating in LEAP-RE clustering activities

- Data Collection, analysis, modelling
- Prototyping, on site experimenting and testing
- Digitized renewable energy Microgrid & Smart Storage Systems
- MAR1, MAR4, MAR5

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LEDSOL

LEAP-RE

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

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LEDSOL

LEAP-RE

Consortium

Consortium

Project coordinator:
- Irina G. Mocanu, Centrul IT pentru Stiinta si Tehnologie, **Romania**

Project partners:

- Centrul IT pentru Stiinta si Tehnologie (**Romania**)

-Tampere University (**Finland**)

- Laboratory of Applied Hydrology and Environment, University of Lomé, (**Togo**)

- Unité de Développement des Equipements Solaires / EPST Centre de Développement des Energies Renouvelables (UDES / EPST-CDER) (**Algeria**)

- Institut für Sozialforschung und Sozialwirtschaft e. V. - ISO (**Germany**)

Aim of the project

LEDSOL is aiming to foster long-term collaboration between Africa and European organizations on sustainable and affordable technologies by providing off the grid clean water through the use of a smart portable unit based on UV/LED disinfection augmented with classical decontamination and powered by renewable energy sources.

Relevance vs MARs

- LEDSOL will support remote areas and communities: (1) suburban areas in Algeria and nomads of Sahara; (2) Togo’s rural areas where clean water is a huge challenge (MARS 3).
- The system is powered by renewable energies and adapted to the needs of the end-users (MARS 3).
- Testing in real life environments (MARS 3).
- Assessment of needs and potential resources at country or regional levels (MARS 1).
- Progress of EU-AU R&I cooperation on RES (MARS 1).

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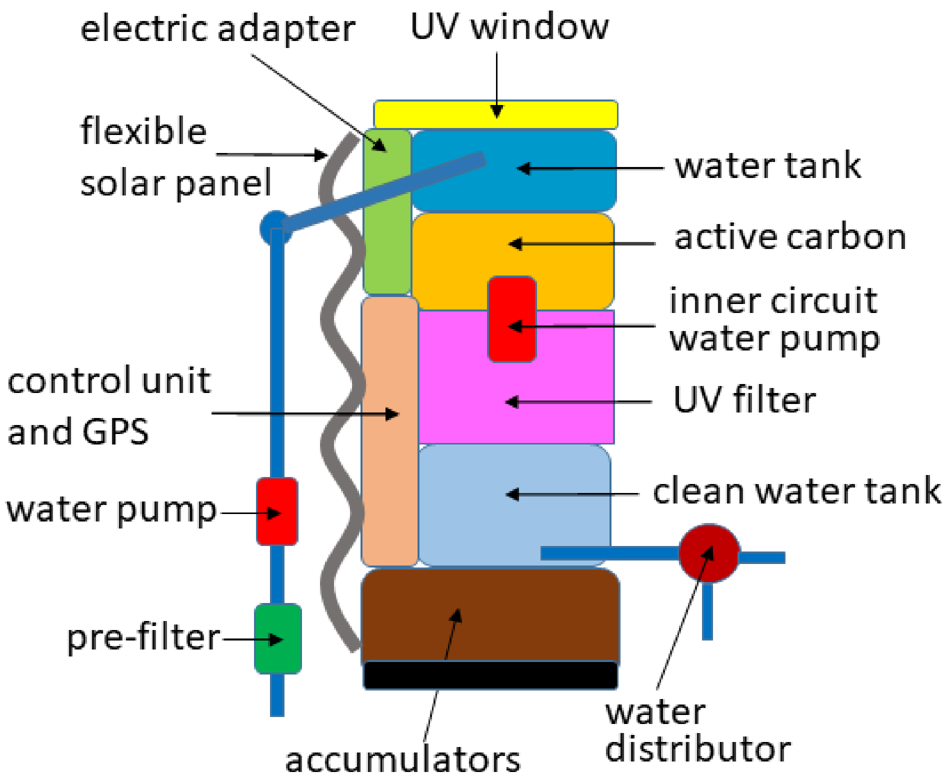
LEDSOL

LEAP-RE



- Two reservoirs of 20 l (e.g., 32x25x25 cm^3) each; one works as intermediate water storage and gets filled directly from the water source;
- Pipe with a rough filter and pump for filling the intermediate reservoir with a flow rate of at least 5 l/min;
- Pump to transfer the water from the intermediate reservoir to the final one through the filter and disinfection subsystem with a flow rate up to 2 l/min;
- Classical water filters;
- UV-filter for disinfection with a processing capacity of 2 l/min; approx. size: 35x15x3 cm^3
- Solar panel as energy source
- Battery for energy storage
- Digital and power electronics to ensure tasks like: energy supply for pumps and UV-filter, localization, supervision, communication, etc.
- Backpack

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LEDSOL

LEAP-RE

Key challenges addressed by the project

1. Development and optimization of the UV irradiation module
2. Development and testing of the solar energy module
3. Data processing and control software
4. Enhanced wireless positioning and tracking algorithms in order to keep track of the water sources and workforce/people
5. Pilots in realistic environments – Lome region, Algeria in (Tipaza and Blida) and Baragan region (Romania)
6. We aim for an affordable system which will be designed by keeping in mind the end-users' needs and local opportunities
7. A business plan for the future exploitation of the LEDSOL results.

Expected results :

- ***Mid-term expected results (end 2023)***
  - ✓ LEDSOL System fully designed
  - ✓ UV irradiation module developed and lab tested
  - ✓ Solar energy module developed and lab tested
  - ✓ Data processing and control module – beta version
  - ✓ Positioning algorithms and solutions – beta version
  - ✓ Report on users' needs
- ***End of project expected results (2025)***
  - ✓ Integrated and validated (real life conditions) LEDSOL system
  - ✓ Pilot results
  - ✓ Business plan for future commercial exploitation
  - ✓ Wide scale and scientific dissemination
  - ✓ Strategy for sustainable cooperation between the partners and with third parties from outside the consortium

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Expected outcomes in case of success of the project (2030)

What could be the impact of the project at 2030 on the economy and/or society in case of scaling up the results of the project ?

1. Certified solution for clean water production that can be easily and widely deployed in remote areas
2. Access to clean water for a large number of beneficiaries (at least 100 LEDSOL units in use)
3. LEDSOL advertised as product by CITST
4. Commercial exploitation contracts with local vendors in Africa and in Romania
5. Long-term and close scientific cooperation between Europe and Africa in terms of 2-3 common grant applications submitted

Which main risks of failure during project implementation ?

Describe the main risks identified for project implementation

1. Availability of components due to electronic component shortage
2. Lower disinfection performance for the UV/LED module than the targeted 99.999% pathogen inactivation
3. Partners quitting the project or underperforming (funds are already cut for Togo)
4. The system does not meet users' expectations and requirements
5. Local policies are impacting the project and in particular funding, visa, pilots, etc

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LEDSOL

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Contribution of the project to AU – EU R&D cooperation

In term of reinforcement of scientific or innovation cooperation, capacity building…

- The LEDSOL project supports cooperation between Europe and Africa during the project and beyond by seeking resources for product development and commercialization:
  - ✓ Task 1.3 will identify key stakeholders for future commercialization through EU-AU cooperation; Task3.3 will assess needs and user satisfaction
  - ✓ Common work will be published as joint publications or applied for IPR protection via common patent applications
- Additional grant applications will be prepared for a sustainable cooperation
- The cooperation network will be extended

Interest of Consortium members in participating in LEAP-RE clustering activities

Which thematic (MARs technologies…) or methodology (modelling, on site experimentation…) members would be interested to share with other LEAP-RE projects?

- End-user input on needs and satisfaction from both pre- and post-piloting inputs
- Algorithms for localization relying on multi-system multi-frequency GNSS and possibly LEO signals (LEO-based validation to be done only through simulations, while GNSS validation is with measurement data)
- LEDSOL system performance

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SolChargE

(re)presented by:

Dr. Ioannis Tsanakas*
R&D Project Manager, CEA-INES (France)

* Attending remotely (online)

LEAP-RE

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SolChargE

LEAP-RE

Consortium

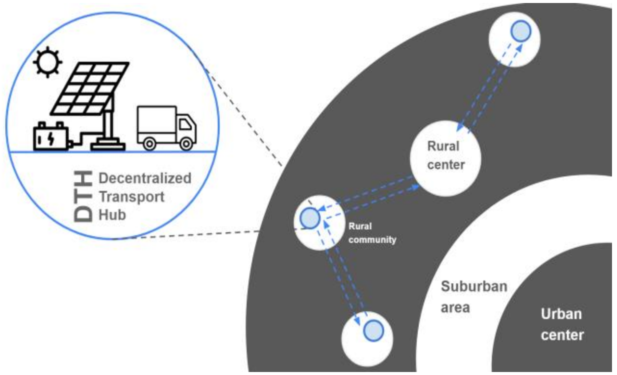
Coordinator - Long history of successful relevant projects in the African context; vast experience in e-mobility R&D; additional focus on rural mobility analysis and LCA/LCCA.

South Africa case - PV systems research facility; training / educational "hub"; real-life experiments PV energy forecasting and battery modelling.

Ethiopia case - rural mobility focus; local availability of components and detailed sourcing strategy; agricultural value chain; local training/education hub.

Complete PV value chain research and testing/fab facilities; focus on the PV and batteries part: design, monitoring, analysis, second-life.

Aim of the project



To develop, build, and pilot a novel stand-alone solar charging station (SASCS) for electric vehicles (EVs) as the central component of a decentralized transportation hub (DTH), in the African context.

Addressed MARs

1. **Mapping joint research and innovation actions for future RES development** – Consolidation of detailed map of R&I initiatives in Europe and Africa → support industry to prioritize and contextualize target areas of RES deployment
2. **End-of-life and second-life management and environmental impact of RE components** - Component value chain, identification of key stakeholders & successful business models promote replicability scenarios of operational models in concerned regions.
3. **Smart stand-alone systems (SAS)** - Development of RE-SAS demonstrator(s) considering the diversity of potential local RE sources and the local effective environment.

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LEAP-RE

Key challenges addressed by the project

1. Access to sustainable electricity, esp. in rural areas.
2. Uptake of reliable mobility in rural areas
3. Recycle/Reuse : Streamline end-of-life management of PV and battery solutions
4. Address cost barriers for certain end-users, e.g. small farmers.
5. Public awareness, engagement and capacity building on the topic.

Expected results :

1. A SASCS optimized for local production and circular principles;
2. A circular business model for local DTH stakeholders;
3. A sustainable investment case for impact investors;
4. Local capacity building for DTH stakeholders;
5. Holistic assessment of DTH (inc. LCA, LCCA)
6. User involvement; Female participation;
7. Intercultural student project.

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Expected outcomes in case of success of the project (2030)

1. System's design, hardware/software fully functional, optimized and scalable/replicable ;
2. Circular business model deployed, validated; Technology/System's on commercial route.
3. Established value & supply chain, include O&M practices loop learning;
4. Up and running training activities, curricula, capacity building of local professionals;
5. End-users / local communities: Proved reliable access to (and benefit from) sustainable electricity and e-mobility;
6. Gender dimension: sustained 50% involvement of female end-users, researchers, professionals, students;
7. Attracted interest for new potential cases and replicators.

Main risks of failure during project implementation

1. Users are reluctant to participate in pilot field tests (M,H)
2. Difficulties to source relevant components for SASCS (M,M)
3. 2nd life components do not meet quality standards (M,M)
4. Regulatory hurdles to import 2nd life components from EU (M,H)
5. Regulatory hurdles to import aCar in SA (L,H)

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Contribution of the project to AU – EU R&D cooperation

- EU→AU knowledge transfer: Address knowledge/research gap on how to implement and maintain solar-powered EV solutions (esp. SASCS) in the African context.
- Aim to contribute to better and more reliable access to sustainable electricity and e-mobility, in accord with relevant multilateral agreements and international governance efforts. These include the Addis Ababa Action Agenda, the African Union's Agenda 2063, as well the recent auto green paper on the advancement of new energy vehicles in SA that proposes a roadmap for the production of electric vehicles in the country.
- AU/EU local capacity building for all DTH stakeholders.
- AU/EU dissemination for awareness, understanding, action and exploitation (workshops, webinars, etc).
- Intercultural student projects.

Interest of Consortium members in participating in LEAP-RE clustering activities

- To share: REX and know-how from the operation and monitoring of our system, the user profiles and the circular concepts on PV and batteries.
- To "receive": REX and know-how from projects addressing possibly the same MARs and/or other relevant MARs e.g.
  - Smart grid (different scale) for off grid application
  - Innovative solutions for priority domestic uses
- More to be discussed in the clustering event.

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THANK YOU

CONTACT US FOR MORE INFORMATION

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