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Abstract	This deliverable summarises the SESA project's cooperation with other EU-funded initiatives to enhance sustainable energy development in Africa. The strategy underscores the importance of collaboration among projects like ENERGICA, REFFECT AFRICA, SophiA, SteamBioAfrica, LEAP-RE, and SolutionsPlus, which share the common goal of accelerating the green transition and energy access across the continent.

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List of Acronyms

SESA	Sustainable Energy Solutions for Africa; European Union's Horizon 2020 research and innovation programme under grant agreement No. 101037141
GA	Grant Agreement
H2020	European Union's Horizon 2020 research and innovation programme
WP	Work Package
REFFECT AFRICA	Renewable Energies for Africa: Effective Valorization of Agri-Food Wastes
ENERGICA	ENERGy access and green transition collaboratively demonstrated in urban and rural areas in AfrICA
SophiA	Sustainable Off-Grid Solutions for Pharmacies and Hospitals in Africa
SteamBioAfrica	Innovative Large-Scale Production of Affordable, Clean Burning Solid Biofuel and Water in Southern Africa: transforming bush encroachment from a problem into a secure and sustainable energy source
EU	European Union
EV	Electric Vehicle

LEAP-RE	Long-Term Joint European Union - African Union Research and Innovation Partnership on Renewable Energy
UNEA	United Nations Environmental Assembly
COP	Conference of Parties
AU	African Union

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Executive Summary

This deliverable summarises the SESA project's cooperation with other EU-funded initiatives to enhance sustainable energy development in Africa. The strategy underscores the importance of collaboration among projects like ENERGICA, REFFECT AFRICA, SophiA, SteamBioAfrica, LEAP-RE, and SolutionsPlus, which share the common goal of accelerating the green transition and energy access across the continent. By leveraging synergies across thematic areas such as off-grid energy solutions, clean cooking technologies, and electric mobility, the strategy aims to foster innovation, knowledge sharing, and capacity building. Through detailed mapping and analysis of sister projects, the report identifies opportunities for co-developing innovations, enhancing technology transfer, and facilitating joint research and publications. The report also outlines specific cooperation mechanisms, including country learning exchanges, technical collaboration on renewable energy technologies, and joint capacity-building initiatives. Success metrics are proposed to evaluate the effectiveness of these collaborative efforts in achieving sustainable and scalable energy solutions in Africa. This strategic approach is envisioned to not only advance the SESA project's objectives but also contribute significantly to the broader EU-Africa partnership on renewable energy.

1 Introduction

The purpose of this strategy is to guide the cooperation of the SESA project with other EU-funded projects to maximise synergies in the field of sustainable energy in Africa. The partnership will strengthen potential cross-linking project goals and deliverables.

In conceptualising the SESA project, it was anticipated that the project would cooperate with sister projects, specifically referencing the projects under the LC-GD-2-3-2020 and the LCSC3- JA-5-2020 calls.

Four projects under the LC-GD-2-3-2020 call (where SESA is part of) focus on accelerating the green transition and energy access in Africa. These projects are:

- ENERGY access and green transition collaboratively demonstrated in urban and rural areas in Africa (ENERGICA)
- Renewable Energies for Africa: Effective Valorization of Agri-Food Wastes (REFFLECT AFRICA)
- Sustainable Off-Grid Solutions for Pharmacies and Hospitals in Africa (SophiA)
- Innovative Large-Scale Production of Affordable, Clean Burning Solid Biofuel and Water in Southern Africa: transforming bush encroachment from a problem into a secure and sustainable energy source (SteamBioAfrica)

These projects are also part of the Green Deal Projects Working Group on Clean Energy, focusing on energy decarbonisation through developing and deploying innovative technologies. The Green Deal projects working group counts for 16 EU funded projects in all. Moreover, under the **LC-SC3- JA-5-2020** call, the Long-Term Joint EU-AU Research and Innovation Partnership on Renewable Energy (LEAP-RE) project is identified as a sister project.

Technology-wise, the SESA project is clustered around three main areas of work (themes). This strategy aims to identify and leverage linkages with other projects addressing the same themes to maximise exchanges and cooperation.

1.1 Background

The transition to sustainable energy is a global imperative, particularly pressing in the African context, where the dual challenges of energy access and environmental sustainability are most acute. The European Union, recognizing the critical role of collaborative international efforts in addressing these challenges, has initiated several projects under its Green Deal call. Among these, the Sustainable Energy Solutions for Africa (SESA) project stands out for its ambitious goal to catalyze sustainable energy solutions across the continent. This initiative is not solitary in its endeavor; it is part of a constellation of EU-funded projects aiming at a similar green transition and energy access in Africa.

1.2 Purpose of the Deliverable

This deliverable aims to outline a strategic framework for enhancing cooperation between the SESA project and other EU-funded sister projects, including ENERGICA, REFFLECT AFRICA, SophiA, SteamBioAfrica, LEAP-RE, and SolutionsPlus (only on electric mobility). The overarching goal is to maximize synergies and foster a collaborative ecosystem that accelerates the adoption of sustainable energy solutions in Africa. By identifying and leveraging linkages across these projects, the strategy seeks to enhance innovation, knowledge sharing, and capacity building, thereby amplifying the collective impact on sustainable energy access in Africa.

1.3 Structure of the Deliverable

The deliverable is structured into several key sections, each designed to provide comprehensive insights into the strategy's components, implementation, and anticipated outcomes:

Chapter 2: Strategic Framework

This chapter presents the strategic framework guiding the cooperation among the SESA project and its sister initiatives. It lays out the foundational principles, objectives, and thematic areas of focus, such as off-grid energy, clean cooking, and electric mobility, alongside cross-cutting themes like capacity building and innovation.

Chapter 3: Sister Project Overviews

An in-depth analysis of each sister project is provided in this chapter, highlighting their objectives, thematic areas, and geographical focus. This section serves as a basis for identifying potential synergies and areas of collaboration with the SESA project.

Chapter 4: Opportunities for Cooperation

Drawing from the project overviews, this chapter outlines specific opportunities for cooperation. It categorizes these opportunities into co-developing innovations, knowledge sharing, and joint research and publications, detailing actionable strategies for each.

Chapter 5: Cooperation Strategies and Actions

Focusing on the practical aspects of collaboration, this chapter delineates the strategies and actions for engaging with sister projects. It covers country learning exchanges, technical collaborations, capacity-building initiatives, and informal exchanges among researchers. Delving into specific thematic areas, this chapter discusses tailored cooperation strategies in electric mobility, clean cooking, waste to energy, and solar PV. It explores how SESA's expertise and networks can be leveraged to benefit partner projects and vice versa.

Chapter 6: Measures of Success

To assess the effectiveness of the cooperation strategy, this chapter proposes a set of success metrics. These metrics encompass research innovations, capacity building outcomes, and the scalability and replicability of sustainable energy solutions.

1.4 Approach

The approach to developing this strategy is grounded in comprehensive mapping and analysis of the sister projects, focusing on their objectives, thematic areas, and geographical coverage. This is complemented by a participatory process involving stakeholders from the SESA project and its sister initiatives, ensuring the strategy is informed by diverse perspectives and expertise. The strategy is designed to be dynamic, allowing for iterative updates and adaptations based on ongoing learnings and changing project landscapes.

This deliverable sets the stage for a detailed exploration of the cooperative strategy between the SESA project and other EU-funded initiatives in sustainable energy for Africa. By aligning efforts, sharing knowledge, and pooling resources, this collaborative approach aims to make a significant contribution to the green transition and energy access across the continent, paving the way for a sustainable and prosperous future.

2 Strategic Framework

A strategic framework with sister project which will ensuring a proper collaboration between the SESA project funded under the LC-GD-2-3-2020 call and the projects funded under the LC-SC3-JA-5-2020 call ("Long Term EU-Africa Partnership for Research and Innovation actions in the area of renewable energy"), is paramount to ensure coherency, reap synergy opportunities and avoid overlaps and will involve several steps which include identifying commonalities among these

projects that have a common vision to contribute to green transition and energy access in the African continent.

This cooperation will cover two levels: Level of activities:

- Country learnings exchanges: exchanges over activities led by the projects funded under the two calls, continuous communication of learnings of SESA demonstration and replication activities (deeper exchange modalities in the case of activities happening in the same countries),
 - Technical exchanges over technologies selected under the SESA project
 - Exchange over capacity building activities with a twofold step:
 1. exchange over the type of capacity building formats selected in each project,
- learning and exchange formats between project actors under the two calls (LC-GD-2-3-2020 and LC-SC3- JA-5-2020) in order to bring together R&I actors and build a broader R&I community.
- Broader research level: Foster exchanges between researchers and publications on topics linked with the activities, supporting, more specifically, young researchers

The developed strategy will help to implement this cooperation, detailing modalities which will ensure frequent interactions between both projects, using various formats. This will be based on a preliminary assessment of the art of the activities led and the products developed under LC-SC3- JA-5-2020, at the start of the SESA project. This will be done for the three major themes under the SESA project listed below.

1. **Off-grid Energy (Solar energy):** Implemented in Kenya, Ghana, South Africa, Morocco, Namibia, Tanzania, Nigeria, and Rwanda.
2. **Clean cooking (Waste to energy/Biogas for cooking):** Implemented in Kenya, Ghana, Malawi Rwanda and Nigeria.
3. **Electric Mobility (Second life EV Li-ion batteries):** Implemented in Kenya, South Africa, and Morocco.

In addition, **capacity building innovation, business model development, and policy development** have been identified as cross-cutting areas where all projects can benefit from cross-learning.

3 Sister project Overview

A mapping exercise was conducted in the beginning of the to identify and cluster projects working on similar themes as the SESA project under the Green Deal Projects Working Group on Clean Energy. This aimed to find more direct ways of linking project partners to maximise the benefits of the exchanges. The key areas for linkages and synergies with sister projects are outlined below.

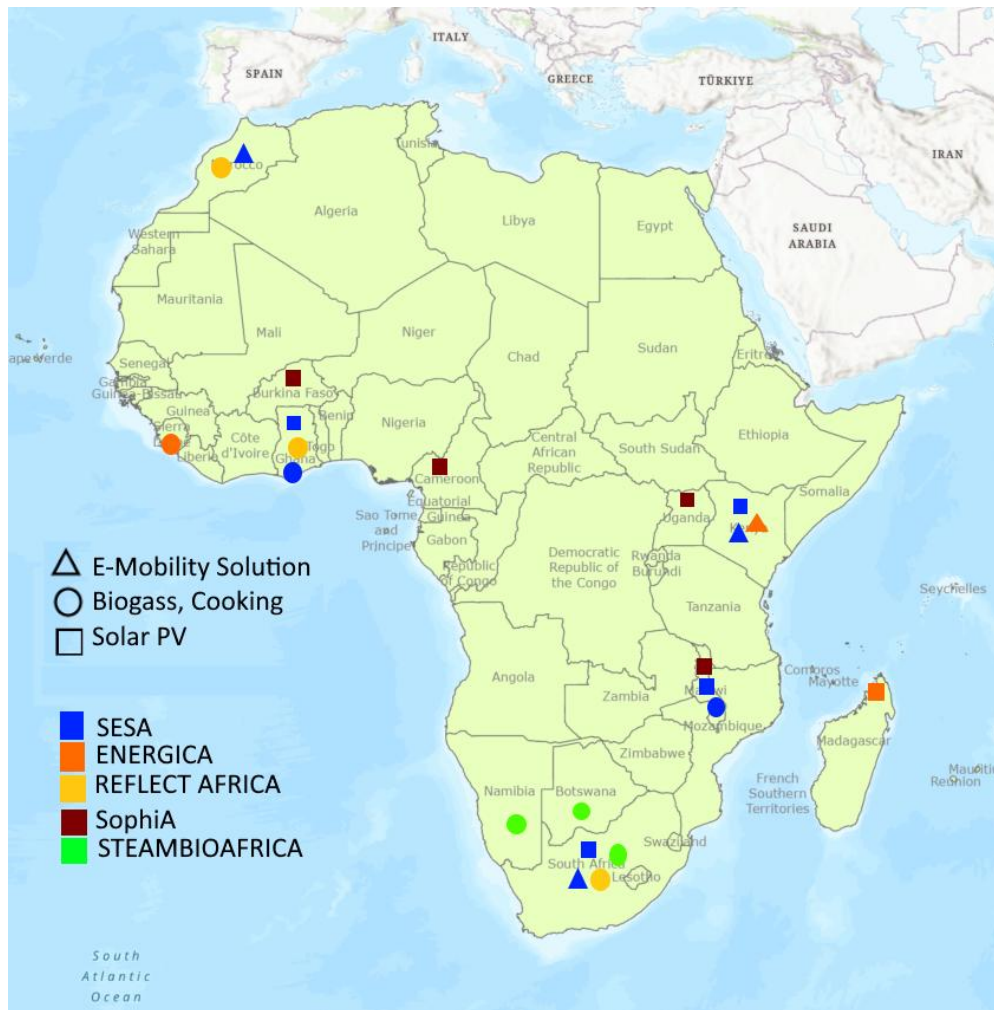


Figure 1: SESA sister project-location and technology interventions

In the following text in this section each of the sister project is briefly described, the possible synergies that can be drawn between sister projects and SESA are discussed in sections with follow this section. Apart from the technology and strategy focus that all the sister projects networking, dissemination and communication are common activities that cut across all EU project and likewise the sister project mentioned here.

3.1 Energy Access in Urban and Rural Africa (ENERGICA)

ENERGICA's objective is to demonstrate the efficient implementation of renewable energy technologies to match the needs of local contexts. To do this, the project focuses on demonstrating innovative nano-grids for the renewable production of water and food in Madagascar, Sierra Leone and Kenya, including a biogas and water purification system for energy, water and food fertiliser production in Sierra Leone; and solar-powered electric mobility for moto-taxis (boda-bodas) in Kenya.

Website: <http://www.energica-h2020.eu>

3.2 Renewable energies for Africa: Effective valorisation of agri-food wastes (REFFECT AFRICA)

The REFFECT Africa Project seeks to provide energy solutions for on-grid and off-grid communities and their integration into the existing energy system through the demonstration of innovative, reliable and adapted sustainable energy solutions based on the valorisation of biomass wastes from agriculture and the food industry through biomass gasification. The expected products are biochar from the gasifier and valuable fertiliser to local farmers. The demonstration will also include a robust but reliable water laboratory to provide their location with basic but often lacking testing services. Demonstration sites will be built in Morocco, Ghana and South Africa.

Website: <http://reffect-africa.eu>

3.3 Sustainable Off-grid Solutions for Pharmacies and Hospitals in Africa (SophiA)

The project seeks to provide sustainable energy supplies and water free of bacteria and viruses for rural and remote health facilities in Africa. This will be done by ensuring access to clean energy, drinking water, and cooling in rural Africa. Demonstration sites will be in remote hospitals in Burkina Faso, Cameroon, Malawi and Uganda.

Website: <https://sophia4africa.eu/>

3.4 SteamBioAfrica

The project is focused on creating a commercially viable technology solution that will stimulate the harvesting of invasive woody biomass. This builds upon the original SteamBio technology and seeks to upscale, adapt, and prove the technology to confirm its net economic, social, and environmental benefit. The technology transforms invasive encroaching bush and other woody species into high-value, clean-burning, solid fuel. Through the project, an industrial demonstration plant will be operated in Namibia while a social, economic, and environmental sustainability validation will be carried out in Botswana, Namibia and South Africa.

Website: <https://www.steambioafrica.com/>

3.5 Long-Term Joint European Union – African Union Research and Innovation Partnership on Renewable Energy (LEAP- RE)

The LEAP-RE project is designed as a pilot for future long-term partnerships. The project seeks to build a community, strategy, organization, methodological assets and tools to set the foundations of a long-lasting AU-EU partnership to address the post-2025 challenges and policy priorities. The project is creating an innovation accelerator, monitoring, evaluating, assessing Impact, and replicating. LEAP-RE aims to reduce fragmentation by aligning existing bilateral and multilateral frameworks and jointly implementing research, innovation, and capacity-building activities.

Website: <https://www.leap-re.eu/>

3.6 SOLUTIONSplus

SOLUTIONSplus aims to enable transformational change towards sustainable urban mobility through innovative and integrated electric mobility solutions. The project brings together highly committed cities, industry, research, implementing organisations and finance partners and establishes a global platform for shared, public and commercial e-mobility solutions to kick-start the transition towards low-carbon urban mobility. The project implements city-level demonstrations to test different types of innovative and integrated e-mobility solutions Rwanda, Tanzania in Africa.

Website: <https://www.solutionsplus.eu/>

4 Opportunities of cooperation

The opportunities for cooperation with the sister projects can broadly be classified into four categories: co-developing innovations, knowledge sharing, capacity building and joint research and publications. A workshop was conducted on January 16, 2024 with sister projects with the help of the Miro board, where inputs on the four areas of cooperation were taken; these are presented in the following sub-sections. All sister project listed in section 3 participated in the workshop (barring Solution Plus), activities of mutual cooperation were discussed and representatives from the sister projects and from SESA project populated the MIRO board templates indicating areas where cooperation can happen. Four templates were used, that is, one each for cooperation on co-developing innovations, knowledge sharing, capacity building and joint research activities. These are further elaborated below.

1. Country learning exchanges and codeveloping innovations

This will focus on exchanges over activities with similar themes under the different sister projects and across countries. Continuous communication of outputs from demonstration and replication activities within countries and across countries will be done through semi-annual online webinars and in person meetings where applicable.

A common communication platform where all sister projects are onboarded is also proposed.

2. Technical exchanges over technologies and knowledge sharing

Selected under the SESA project within countries. Some of the proposed exchange areas within the different themes are:

- a. Implementation of replicable energy technologies
- b. Maintenance of renewable energy solutions
- c. Practical business models for identified energy solutions.

3. Exchange over capacity building activities:

The SESA project will seek to exchange with the other projects on the formats and methodologies of capacity building as well as modalities for engaging research and innovation actors. This will serve to improve capacity building activities in the countries and leverage synergies if capacity building measures are organized in the same areas.

4. Exchanges between researchers on scientific publications: regarding topics linked with the activities.

The five SESA solution, that is solar hub, off-grid solar, bio-cooker and biochar, infostops and end of life batteries were indicated in different colours at the bottom of MIRO board template and each sister project representative picked up a post it next to the SESA solution and indicate if and how the cooperation can happen with SESA. Results from the interaction are discussed in the following sub-sections.

SESA Solutions	SESA Activities
Solar hub for varied use cases (agricultural use, cooking and lighting, e-mobility, E-waste management)	SESA toolbox, evaluation and Impact assessment
Containerised off-grid solar energy system	LCA Assessment
Biocooker and biochar	Capacity Building
InfoSpots for ease of information access and connectivity	Incubator programme
Sustainable model housing unit	Business models development and partnerships
End-of-life management of lithium-ion batteries	Co-development of Innovation, Validation and Replication
	Scale-up, policy integration, institutionalisation and finance

Codeveloping innovations
Knowledge sharing
Capacity building
Joint research

Sister Projects			
ENERGICA			
Nano-grids in rural Madagascar	Innovative business models		
	Local production and manufacturing		
Low-tech efficient biogas system and water purification in peri-urban Sierra Leone	Capacity building		
	Data gathering for impact assessment		
Solar powered e-mobility solution for boda-boda in urban Kenya	Local stakeholders engagement through a co-creation methodology		
	Applicability to many different technical and socio-economic contexts		
	Replication		
SteamBioAfrica			
Superheated steam processing of invasive woody biomass into clean burning biofuel and water in rural <i>Namibia</i>	Sustainable and inclusive business plans		
	Large scale replication for economic impact, and jobs creation		
	Confirm market acceptance		
Validate the biofuel with domestic and industrial customers in <i>Namibia, Botswana, and South Africa</i>	Quantifying over five different market opportunities		
	Create a plan for post project exploitation of results		
LEAP-RE			
Renewable energy research and innovation	Joint research and innovation actions		
	End of life and second life management of renewable energy components		
Renewable energy capacity building	Smart stand alone systems for energy access		
	Processes and appliances for productive uses to prioritize boosting small-scale farmers' productivity and incomes in the agricultural production		
LEAP-RE App	Innovative solutions for priority domestic uses (clean cooking and cold chain)		
SophiA			
Off-grid carbon-neutral electricity for heating and cooling of food and medicine, and safe and clean drinking water	Initial testing at 4 field tests		
	Evaluation and Assessment to inform replication (a modular containerized version as a showroom)		
Low global-warming-potential (GWP) natural refrigerants that covers cooling in 4 temperature ranges	Training guidebook to facilitate local assembly		
	Capacity building and appropriate financing solutions		
Highly efficient thermal energy storage (solar)	Private and public sector involvement		
	New markets creation for EU SMEs		
REFLECT AFRICA			
Sustainable energy solutions based on the valorization of biomass wastes from agriculture and the food industry through biomass gasification	Carry out comprehensive LCA and LCC of each supply chain		
	Compare tested technologies to other technologies in the African context		
On- and off-grid solutions in different socio-economic backgrounds (<i>Morocco, Ghana and South Africa</i>)	Provide water laboratory for testing services		
	Integration of solutions into existing energy system		
Biochar from the gasifier to provide valuable fertilizer to local farmers.	Testing in different socio-economic backgrounds (urban and rural)		

Figure 2: SESA sister project-Opportunities of cooperation

4.1 Co-developing innovations

Strategically, co-developing innovations with sister projects in the sustainable clean energy sector can result in substantial progress in sustainable technologies and practices. This collaborative approach can accelerate the development of sustainable clean energy solutions by capitalising on the strengths and resources of various projects.

In Figure 1, results from a workshop with sister projects on areas where several essential elements and advantages of co-developing clean energy innovations were analysed; these were categorised as alignment of objectives and developing synergies, resource sharing, technology integration, stakeholder engagement and innovation and research development.

The SESA project aims to achieve the following high-level objectives:

Inform: To boost the accessibility of innovative, affordable and efficient renewable energy solutions in the African continent,

Inspire: To facilitate exchange and partnership between Europe and Africa on sustainable energy innovations,

Initiate: To enable innovators in urban and rural communities in Africa to leapfrog to sustainable energy access,

Implement: To co-develop, validate and replicate innovative energy solutions tailored to urban and rural contexts across Africa,

Impact: To foster long-term partnerships and exchanges on innovative, sustainable energy solutions

These objectives are sought to be achieved through the **development of a modular demonstration project** to provide sustainable energy solutions that are relevant for validation and replication in both urbanised and rural contexts in Africa, creating opportunities to generate sustainable off-grid electricity, with linkages to use cases such as cooking, lighting, fishing, water pumping, mobility and waste management, and combining energy solutions with local Info Spots for access to information, on energy, climate change and digital skills.

SESA objectives are synergistic with the objectives of the sister project, which are mentioned in the introduction to the sister projects, as these projects have an overlapping shared vision which aligns with the overarching goals of providing and supporting sustainable clean energy solutions.

ENERGICA aims to foster collaboration between partners in Africa and Europe on energy access and sustainable energy development. An essential aspect of the ENERGICA approach is building on local energy and resource needs. To do so, partners use co-creation approaches to link all local social and techno-economic actors. Multiple benefits are expected when employing this approach: the offer is adapted to the local context, and the potential for market uptake and replication is very high. These objectives are very close to SESA objectives.

ENERGICA also works in the Diana region in Madagascar, Freetown in Sierra Leone, Nairobi and Kisumu in Kenya. SESA also has its projects in Kenya; the geographic focus of both projects provides opportunities leveraging complementary strengths and developing synergies; these collaborations can accelerate the development and deployment of innovative clean energy solutions in the African regions and facilitate partnerships between Europe and Africa for the purpose. JOKOSUN, a partner in the ENERGICA consortium, is working on end-of-life batteries in Kenya; the nano grids demonstration in Madagascar aligns well with similar SESA solutions in

Morocco, Ghana and Kenya. In SESA The energy solution applied in the Wetu Katito and Kisegi living labs in Kenya are self-sustaining solar hubs that provide clean, affordable and renewable energy for productive use in rural and urban areas (e.g., for agricultural applications, mobility, educational and economic purposes); Provide clean water supply at the hubs through solar water pumps and state of the art filtration systems; Connect solar hubs to local markets and businesses through e-mobility; Provide clean lighting products such as solar lanterns to local fisher folks and other businesses. SESA has also established Living Labs in Ghanaian cities, collaborating with Econexus and NASTECH, two local SMEs. These Labs serve as testing grounds for innovative ideas, technologies, and policies, aiming to find effective solutions for sustainable energy transitions. Like and has been involved in research on second life batteries in Morocco. Likewise, the Rwanda replication action in SESA project is working with SLS energy and Eco-Green to provide energy storage solution using second life batteries.

So there are also cross-learning, technology integration and resource-sharing possibilities between the SESA validation site in South Africa and ENERGICA work in Kenya and likewise between Madagascar from ENERGICA project and Morocco, Ghana and Kenya for nana grids.

REFLECT Africa, As previously mentioned, aims to facilitate energy solutions for both grid-connected and off-grid communities, as well as their integration into the established energy system, by showcasing sustainable energy solutions that are adaptable, dependable, and innovative. These solutions are predicated on the gasification of biomass wastes from the food and agriculture sectors.

The anticipated outcomes are biochar produced by the gasifier and valuable fertiliser for local farmers. In addition, the exhibition will feature a dependable yet robust water laboratory that will supply their site with fundamental yet frequently inadequate testing services. They have three demonstration sites in Morocco, Ghana and South Africa. To study the impact of these demonstrations.

Thus, like ENERGICA, REFLECT Africa also has a clear strategic, thematic, and geographic overlap of objectives with the SESA project, especially with the clean cooking and waste-to-energy solution under the SESA project. This also establishes a strong possibility of sharing technology integration for joint stakeholder engagement in these countries between SESA and REFLECT Africa on topics related to clean cooking and water to energy.

The objectives of SophiA are to provide sustainable energy supplies and water free of bacteria and viruses for rural and remote health facilities in Africa. This will ensure access to clean energy, drinking water, and cooling in rural Africa. Demonstration sites will be in remote Burkina Faso, Cameroon, Malawi and Uganda hospitals. The solar storage intervention in SophiA aligns well with SESA's initiatives of providing solar hubs for cooking and lighting and off-grid solar energy systems, creating good synergies with SESA interventions in Morocco, Kenya, and Ghana. Thus creating a solid area where resources can be shared, technology integration can happen, and also for innovation and research development in solar energy storage.

As stated earlier, the SteamBioAfrica project aims to develop an economically feasible technological solution that effectively promotes the collection of invasive woody biomass. Expanding upon the initial SteamBio technology, this endeavours to validate the technology's net economic, social, and environmental benefits through scalability, adaptation, and experimentation.

LEAP-RE aims to establish a sustainable collaboration between European and African stakeholders through a quadruple helix framework: civil society, research and academia (including funding agencies and program owners), the private sector, and research and academia. By developing a framework, methodology, and cooperation model, impact will be pursued. To reduce fragmentation, existing multilateral and bilateral frameworks are to be harmonised.

LEAP-RE will establish and implement collaboration activities about capacity building, innovation, and research. The LEAP-RE and SESA projects have major elements on capacity building and community exchanges where both projects would draw significant synergies. In addition, LEAP-RE is set up to enhance project synergies within the EU funding calls. In terms of resource sharing, the "leap-re.app" can be a resource that can be shared with sister projects, including SESA, Energy Village and LEOPARD, to project portfolios in LEAP-RE project, which have possibilities of joint technology integration possibilities with several solar energy interventions within the SESA project.

Co-developing innovation among sister clean energy projects is essential for accomplishing Africa's EU energy transition objectives. By establishing congruent goals, capitalising on mutually reinforcing capabilities, and fostering synergies, these partnerships can potentially expedite creating and implementing sustainable clean energy technologies. In addition to technical and operational coordination, success in these endeavours demands a collective dedication to ensuring a sustainable future.

4.2 Knowledge Sharing

Knowledge sharing to collaborate with sister projects on clean energy entails the interchange of best practices, information, and experiences among organisations or projects that share the common objective of advancing and developing sustainable clean energy sources and leading to innovation, improving operational effectiveness, and expediting the integration of sustainable clean energy technologies. Figure 2 is the result of the Miro board workshop, where the sister projects identified areas and topics where knowledge sharing could happen.

Knowledge can be shared on the technologies that are being implemented, and as observed in the earlier section, there are several areas where technologies used in SESA have alignment with technologies used in the sister projects, with ENERGICA on the off-grid solar energy systems, solar power e-mobility and use of biogas for clean cooking and other purposed. Thus, there is a lot of scope for sharing experiences and best practices, for example, the capacity building program in ENERGICA and impact assessment for batteries and their end-of-life management.

Again, SESA interventions such as Solar Hub, solar cooking, and info spots can share knowledge on technology with SopiA, for example, with the solar excellence centre and with solar cooking interventions. Sophia also has best practices for training the trainers for off-grid solar solutions, which can be common knowledge that can be shared with sister projects, including SESA.

SESA and SopiA both use life cycle assessment as one of the methods to study the impacts of their intervention, creating scope to share knowledge on environmental impact assessment methods and results. Likewise, SopiA also uses Environmental Social Impact Assessment methods for studying impacts. The impact assessment indicators used in SESA projects also cover the social and environmental impacts, so there is a possibility of sharing knowledge on social and cultural sensitivities of the interventions. Lastly, as both projects also aim for scale-up scenarios, there is scope for sharing knowledge on scale-up and the replicability of the projects.

The knowledge created while implementing projects on biomass and clean burning of bio-fuels in rural Namibia as part of SteamBioAfrica, Botswana and Africa and similar interventions of cooker and biochar in Malawi and Ghana in SESA has several possibilities of knowledge sharing experiences and technology application knowledge.

Among the best practices are the gender-inclusive guidelines, the gender progress plan, and the gender transformative tools kit, which are resources produced under SteamBioAfrica that can be used across all sister projects. These products are also good examples of where social and cultural sensitivity knowledge can be exchanged with projects like SESA, as these are also part of the user needs assessment and impact assessment of interventions in the SESA project.

REFFECT Africa also has projects on biomass, on and off-grid solutions and Biochar, which create a platform for knowledge sharing with the SESA projects on the technology of how these interventions can be applied in the context of African countries. REFFECT Africa has e-programs for capacity-building programs and best practices for testing methods, which are things that other sister projects can adopt and use as technologies overlap. The impact of current waste management methods and agri-food supply chains is impact assessment knowledge that others can gain from the REFFECT Africa project.



Figure 4. Knowledge sharing with sister projects

With LEAP-RE, there are several, given the possibility of knowledge sharing across sisters. LEAP-RE has created a knowledge repository, creating the possibility of transferring knowledge on technology use in sustainable green energy solutions/interventions. The leap-re. app is a best practice that can be shared among the sister projects. LEAP-RE also encourages all the sister projects to use the LEAP.RE app. Likewise, LEAP-RE is also collecting information and documenting the impact of organising online vs physical events, a knowledge that comes from the LEAP-RE project that sister projects can gain from and consider while making choice between organizing a online event against a physical event.

4.3 Capacity Building and Joint Research and Publishing

Each of the sister projects has a capacity-building component as one of their deliverables, creating the possibility of developing joint materials like manuals, training courses and programs on technology know-how, project management, community engagement, and tools and methods that can be used for networking and creating partnerships. Figure 3 has the outputs from the Miro board workshop with the sister projects.



Figure 5. SESA Capacity building and Joint Research and Publishing with sister projects

For each technology developed in ENERGICA, training manuals and training courses will be created in collaboration with the project partners and the local stakeholders' needs identified. Similar manuals and being prepared to help the operator and for the technical and vocational training in the SESA project for solar PV and clean cooking interventions, creating the possibility of sharing resources and possibly disseminating results and building a knowledge transfer roadmap. From the SESA project SESA webinars and e-courses on e-mobility¹, 2nd life batteries², rural internet access³, and clean cooking⁴ are resources which sister project can use and gain from.

¹ <https://nuacampus.org/llcu/courses/electric-mobility-sesa/>

² <https://nuacampus.org/llcu/courses/second-life-ev-batteries/>

³ <https://nuacampus.org/llcu/courses/rural-internet-access/>

⁴ <https://nuacampus.org/llcu/courses/clean-cooking-and-waste-to-energy-sesa/>

Likewise, SophiA has a work package to develop synergy activities in joint EU projects, i.e., communication, dissemination, and capacity building. So joint capacity building activities are possible with SESA on solar, cold chain and water treatment. There can be joint programs on Solar and Infospots with SophiA on community engagement tools and creating networks and partnerships.

The two key outputs from the SteamBioAfrica on gender progress plan and gender-inclusive guidelines are key topics and resources that other sister projects can use for capacity building on project management and project operations. REFFECT Africa has in their consortium secondary education establishments, research organisations and other for-profit entities. The sister project partners from REFFECT Africa indicate that there can be a sharing of know-how for capacity building for on-grid and off-grid communities and their integration into the existing energy systems. REFFECT Africa is also implementing a comprehensive community media management strategy and also creating an on-line and off line community. SESA is also developing community of practice as part of its task 2.5 under Workpackage 2 on Solar PV, Cookstove and waste to energy and on electric mobility. These are clear areas where cooperation can happen and resources including key resource person can be shared across sister projects.

Thus SESA and other sister projects can cooperate with REFFECT Africa for capacity building of target groups on tools for community engagement, and also for networking tools REFFECT Africa is also creating possibilities with workshops/events and with meetings to disseminate results. LEAP-RE is a critical pillar in internal consortium research and capacity-building activities; they have also formed a stakeholder forum. So, like other sister projects, there can be sharing capacity on building material, methods and tools on technical know-how, project management, community engagement and networking and partnership development with LEAP-RE.

Collaborative research prospects with sister initiatives focused on sustainable clean energy are extensive and varied, presenting the chance to pool knowledge, assets, and goals to address the intricate complexities associated with energy transition and sustainability. Collaboration in research endeavours has the potential to yield more productive and far-reaching innovations in technology, methodology, and implementation strategies compared to efforts conducted in isolation. Joint research can happen in areas where SESA has compatibility and synergies with sister projects, as has been discussed in the earlier section.

These joint experiences can lead to case study development, research on barriers, impact assessment, business models, etc. for example, SESA experience and the experience of ENERGICA in implementing nano grids in Madagascar or batteries in Kenya; use of renewable energy sources for on-grid and off-grid solutions as part of REFLECT Africa; and with SophiA on the experience of Infospots. Because there is complementarity in approach and intervention resources like the gender action plan, research on social inequalities within the biomass industry in Southern Africa, gender-inclusive guidelines, etc. prepared by SteambioAfrica, become good resources which other sister projects like SESA can use to develop their research on these areas further. With SophiA there are possibilities of sharing resources for joint research on SolarHub and off grid solar and with REFLECT Africa on renewable energy sources for on-grid and off grid application and energy conversion.

5 Cooperation strategy and actions

Using the results from the mapping exercise in section 4, the SESA project will seek to maximise cooperation with sister projects through:

Using the mapping exercise above and Clean Energy Working Group Action Plan (Green Deal Projects Support Office) the SESA project can have following lines of engage with the sister projects:

1. Co-dissemination efforts will be made in close collaboration with sister projects, to help boost each other's impact. Specific actions will be agreed with projects or thematic partners at a bilateral level and may include:
 - Active participation in online networking platforms and events developed by the projects.
 - Where possible mutual cross-reference of projects on the websites.
 - Cross posting of capacity building, training, and e-learning opportunities on partner social media platforms.
 - Exchange of best practices, knowledge, and information during ad hoc meetings.
 - Promotion of milestones, opportunities and events on the websites and newsletters of projects.
 - Participation in events, workshops, panels etc. organized by the projects.
2. Policy inputs and development
 - Preparation of common position papers
 - Common meetings with decision makers
3. Technical discussions on subthemes
 - Matchmaking between WG projects to learn more and discuss common topics of interests
 - Business model mapping and funding schemes the projects use or identify for future purposes
4. Capacity building and training
 - Thematic webinars and discussions to share existing knowledge and the best practices
 - Organisation and deliver of trainings
5. Joint research and publishing opportunities will also be explored across the projects during bilateral and the Clean Energy working group meetings.
6. Linking of experts working on similar topics in the same country

Opportunities for the same can be explored during jointly organize side events on energy access in Africa during regional and international events e.g., COP 29, UNEA, any AU events.

5.1 Cooperation on Electric Mobility

The SESA project will leverage already existing sectoral expertise, established networks and platforms and experience from SESA partners on electric mobility. Partners of the sister projects can benefit from this knowledge and network.

United Nations Environmental Program (UNEP), a SESA consortium partner, implements a Global Electric Mobility Program (GEF) with activities at the global, regional and national level. UEMI (a

SESA consortium partner) coordinates the SOLUTIONSplus project, an EU funded project on urban electric mobility, which was also critical in the development of the SESA project concept, highlighting the need for cross-sectoral approaches that link electric mobility and energy generation and distribution. The GEF and SOLUTIONSplus projects for a joint global programme, which provides an ideal opportunity for SESA to benefit from learnings from Europe, Asia, Africa and Latin America.

Specific ways in which cooperation on this topic will be pursued are described below:

Codeveloping innovations: Electric mobility country experiences where there is intersection to the SESA project countries will be shared to inform better implementation of demonstration projects. For example, the experience in implementing electric 2-wheeler projects in Kenya will be shared to inform both the ENERGICA and SESA demonstrations in Kenya and Tunisia. Specifically, **the co-development of innovations on mobility** in Kenya will be supported under the ENERGICA and SESA projects.

Knowledge sharing will be encouraged through the SESA community of practice for electric mobility to improve the implementation of current and future projects. In addition, there exists a repository of knowledge products ([emobility.tools](#)) established under the SolutionsPlus project where SESA partners as well as other sister projects can benefit from. Products from SESA and sister projects related to emobility will also be added/ linked to the repository. Cross sharing of this repository will also be done in the SESA platform. Calls for proposals, expressions of interests as well as any major milestones will be shared through the LEAP RE app (<https://leap-re.app>). This is the common communication platform where all sister projects have been onboarded. Opportunities will be explored to jointly organize side events on e-mobility in Africa during regional and international events e.g., COP 29, UNEA, AU events, etc.

Capacity Building- All sister projects will be included in the regional capacity building activities offered by UNEPs Global E-mobility Program and SolutionsPlus including its regional trainings. SESA community of practice, and webinars and e-course on electric mobility is also a very good resource that can be shared. Likewise, there are similar activities being planning under the ENERGICA project which can be a good resource that SESA can tap onto. Likewise, individual and institutional resources from ENERGICA project can be used as part of the community of practice being developed under the SESA project.

Joint research and publishing opportunities will also be explored across the projects during bilateral and the Clean Energy working group meetings. Opportunities will be explored to leverage on the electric mobility research that has already been initiated under the SOLUTIONSplus project with various academic institutions involved in the sister projects, for example ENERGICA, especially on the end of life batteries in Kenya where both SESA and ENERGICA are involved.

5.2 Cooperation on clean cooking and waste to energy

Based on discussion in the section on opportunities for cooperation SESA in utilizing pre-existing sectoral expertise, established networks and platforms, and the knowledge of SESA partners regarding waste-to-energy and clean cooking, the SESA project will capitalise on these assets. The sister projects' partnerships can derive advantages from which all partners can benefit, for example, with ENERGICA on biogas systems, with SteamBioAfrica on biomass and clean burning fuel and with REFLECT Africa on energy from biomass waste, biochar and biomass gasification.

SESA intervention in Solar PV hub, energy-water nexus in Kenya, South Africa and Morocco also has a lot of synergies that can be explored with sister projects like ENERGICA, SophiA, REFLECT Africa and LEAP-RE.

Specific ways in which cooperation has been discussed in the section on opportunities for cooperation. Some key takeaways on cooperation for clean cooking and waste to energy are highlighted below.

Co-developing innovations: Experiences from countries that have under the SESA project will be shared so that demonstration projects can be carried out better. SESA project will share what has been learned about putting in place "Small MIG Bio-cookers – local production and distribution, with USB port for charging, including a focus on biomass fuel supply chain" in Malawi and "Clean and Efficient cook stoves" in Ghana with ENERGICA, SteamBioAfrica, REFLECT Africa, and LEAP-RE. It will also be looked into whether new ideas for clean cooking and turning trash into energy can be developed together.

Knowledge sharing: Through the SESA community of practice for clean cooking and waste to energy, people will be encouraged to share what they know to make current and future projects run more smoothly, spread knowledge, and share capacity building resources. The SESA project also set up a repository of knowledge products called the SESA toolbox. This, along with the community of practice webpage on the SESA website, is a source that SESA partners and other sister projects can use. Links to clean cooking and waste-to-energy products from SESA and sister projects will also be added to the repository. By sharing resources and knowledge, attempts will be made to move swiftly from research and development to deployment and scaling, and incorporating different viewpoints among sister projects should lead to more creative, context-specific and more effective solutions for barriers and challenges faced by this solution in the African context. Like electric mobility the LEAP-RE app can be used as a common platform to link the project specific and joint knowledge that is created by the sister projects. In the same way, opportunities will be sought to organize side events together in Africa during regional and international events like COP 29, UNEA, AU events, and so on. These events will be similar to the proposal for e-mobility.

Capacity building: Knowledge on the technology know of how clean cooking and waste to energy technologies are being implemented in the SESA project in Ghana and Malawi and under SteamBioAfrica and REFLECT Africa project will be a good resource that can be used to develop capacity building and knowledge transfer roadmap which can help in upscaling these technologies. So, the capacity building activities under the SESA project will be linked to the training and qualification activities in the REFLECT Africa project and knowledge resources from SteamBioAfrica can be jointly shared by sister projects for capacity building. The sister projects' websites can all have links to resources that are useful for capacity building on cookstoves and waste to energy.

Joint research and publishing. There are cross cutting themes and also common geographical focus among the sister projects. The community of practice that on clean cooking and waste to energy will be used to explore the joint research and publishing options. The research on social inequities with the biomass industry is gender inclusive guidelines were already listed in during the MIRO board exercise, in addition there will be opportunity for research on impact assessment (for example on use of life cycle assessment methods), business models, value chains, just transition, etc.

5.3 Cooperation on Solar PV

SESA intervention in Solar PV hub, energy-water nexus in Kenya, South Africa and Morocco also has a lot of synergies that can be explored with sister projects like ENERGICA, SophiA, REFLECT Africa and LEAP-RE. In the section on opportunities for cooperation, the specific ways to work together were discussed. Here is further elaborations about working together for Solar PV solutions, which more or less follows the line of discussion on cooperation on the other two technologies mentioned in earlier sections.

Co-developing innovations: The SESA experience and knowledge gained from off-grid solar hubs in Kenya, including the installation process, manual for battery storage and the innovation in implementing these technologies, can be shared with sister projects. Solar PV irrigation has attracted a much wider recent attention, and SESA can share its experience on the same with sister projects. Likewise, experiences with microgrids, and energy storage solutions are experiences from SESA that can be shared with sister projects and a wider global audience. The experience of energy exchanges organized within SESA project with local government and also help other sister projects.

Knowledge sharing: The SophiA project created the solar excellence center, and the SESA project created e-learning and other resources can be used to help people build their skills and capacities. Like other technologies, the LEAP RE app (<https://leap-re.app>) can be used to keep up with calls for proposals, expressions of interest, and important dates, and share links on knowledge being created across different sister projects. This is the place where all sister projects can talk to each other. Like e-mobility, clean cooking, and turning trash into energy, COP 29, the World Urban Forum, the ICLIE World Congress 2024, the RISE Africa 2024 Action Festival, and other events can be used to share and spread common knowledge.

Capacity building: Knowledge on the technology know of how Solar PV technologies are being implement in the SESA testbeds and under ENERGICA, REFLECT Africa and SophiA project will be a good resource that can be used to develop capacity building and knowledge transfer roadmap which can help in upscaling these technologies. Also, the capacity building activities under the SESA project will be linked to the training and qualification activities other sister projects. The community of practice under SESA project will be used as a means to coordinate capacity building activities and for joint sharing of resources for capacity building.

Joint research and publishing : As there is so much synergy amongst the sister projects, it is possible for SESA and its sister project to publish together by working on business models and strategies for technologies and solar PV intervention in the market. This will help create scalable solutions that have a big effect on Africa's energy problems and help reach international sustainability goals. At meetings of the bilateral and Clean Energy working groups, chances to do research and publish together will also be looked at for all the projects.

To find out how well cooperation with sister projects on sustainable clean energy is working, you have to look at how well, how much, and what the results of the joint efforts are. Success metrics should be multidimensional, showing what was done in research and development and what was done to build people's skills, change policies, and help society as a whole. A few indicators that can be used are listed below.

1. Research innovations and outputs.
 - Number of joint publications

2. Capacity building and knowledge transfer
 - The number of joint training sessions, workshops, and seminars organised, and the number of participants trained, indicating capacity building.

Project partners



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