SESA
Smart Energy Solutions for Africa

DELIVERABLE 2.2
CAPACITY BUILDING TOOLS AND UPDATES

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Summary Sheet

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Abstract	The Capacity Building Tools and Updates report (D2.2) provides an overview of the capacity building tools and methodologies that is being developed by SESA project partners under Work Package 2 (WP2): *Capacity building, city-to-city cooperation and professional development*. Task 2.2 (T2.2) *Capacity tools and methodologies* aims to offer capacity-building activities for professionals in the living labs and beyond, focusing on individual technical aspects related to the demonstration projects, business models, finance options, vision building, emerging ecosystems, and policy frameworks.

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List of Abbreviations

SESA	Smart Energy Solutions for Africa
ICLEI ES	ICLEI European Secretariat
AAU	Aalborg University
AAMUSTED	Akenten Appiah-Menka University of Skills Training and Entrepreneurial Development, Kumasi
BIF	Basic Internet Foundation, Kjeller
BTH	Blekinge Institute of Technology
ELICO	Energy and Livelihoods for Communities Foundation
F6S	F6S Network Ireland
GEP	Green Energy Park
GG	Going Green
ICLEI ES	ICLEI European Secretariat
ICLEI WS	ICLEI e.V.- Local Governments for Sustainability (World Secretariat)
ICLEI AS	ICLEI Africa
TUB	Technische Universität Berlin
LEITAT	Leitat Technological Center
MIGS	Make It Green Solutions
MET	Metanogenia, S.L.
NMU	Nelson Mandela University – uYilo eMobility Programme
NUST	Namibia University of Science and Technology
SEI	Stiftelsen the Stockholm Environment Institute
SIN	Smart Innovation Norway As
SIEMENS	Siemens Stiftung
CENEX NL	Stichting Cenex Nederland
RISE	Research Institutes of Sweden AB
TEC	Tecnalia
ToT	Training of Trainers
TEL	Technology Enhanced Learning
UR	University of Rwanda
DTU	Danmarks Tekniske Universitet
UNEP	UN Environment
UNH	UN-Habitat
UEMI	Urban Electric Mobility Initiative
WeTu	WE!Hub Victoria Limited
WI	Wuppertal Institute for Climate, Environment and Energy

Executive Summary

The Capacity Building Tools and Updates report, developed as part of the Smart Energy Solutions for Africa (SESA) project, outlines the project's objectives and scope to strengthen knowledge across stakeholders, as well as the methodology used to achieve those. This report focuses on Work Package 2 (WP2), specifically Task 2.2 (T2.2) on Capacity Tools and Methodologies. It provides an overview of the capacity building plan, the development of E-learning modules for various SESA energy solutions, the hosting platform for these courses, regional platforms, and a database of experts. The report also discusses the integration of various guidelines and methodologies related to demonstration projects, climate resilience, and renewable energy solutions into the SESA toolbox and the linkages that the work undertaken has with other EU (but not only) projects and initiative with a similar scope of work.

The Capacity Building Plan for the SESA project, developed under Task 2.1, assessed the present capacity and identified capacity gaps for the Living Lab sites in Kenya, Ghana, Malawi, and South Africa. The identified capacity gaps revolved around several thematic areas, including policy and legal gaps, stakeholder and community knowledge and awareness, limited human and technical skills, restricted access to finance, and inadequate infrastructure. These findings informed the development of the Capacity Building Programme and the content for E-learning modules, besides various other activities and deliverables within the SESA project which are closer to the specific topics, ultimately aiming to bridge the identified capacity gaps in sustainable energy development in the target countries.

The SESA project has established Regional Platforms that supports the organization and coordination of regional teams and partners, aiming to maximize the adoption and replication potential of energy innovations tested within the project. These platforms facilitate a common implementation methodology, allowing detailed plans for demonstration actions, technical and operational aspects, business model adaptation, stakeholder engagement, and replication to be developed. The Regional Platforms are organized both geographically and thematically, promoting knowledge exchange, region specific capacity building, and replication across partner regions. Regional Training and Exchange activities are linked to project activities including capacity building, established within regional platforms.

The Capacity Building Programme within the SESA project encompasses an integrated e-learning initiative hosted by the NUA Campus platform, developed in collaboration with partners such as TUB, the Wuppertal Institute, and UN-Habitat. The programme provides free access to self-paced courses as well as webinars for a diverse audience, including students and civil society organizations. These courses aim to promote knowledge sharing and capacity building, with the potential to reach a broader audience beyond the project's scope through online dissemination and YouTube channels. Currently, courses cover topics such as Solar Energy, Clean Cooking/Waste to Energy, and Electric Mobility, with additional courses in the pipeline for subjects like Second Life EV Batteries, Rural Internet Access, and Smart Microgrids . The training curricula encompass a wide range of materials related to technical aspects and related issues such as local and national policies (especially in the webinars), including slide decks, presentations, module outlines, handouts, quizzes, key background material, videos, and webinars.

In summary, this report plays a pivotal role in the SESA project's mission to promote sustainable energy solutions in Africa by providing a comprehensive overview of capacity building tools, methodologies, and strategies tailored to the specific needs of the Living Labs in multiple African regions.

1. Introduction

The Capacity Building Tools and Updates report D2.2, developed through the Smart Energy Solutions for Africa (SESA) project, intends to assist the SESA project, its partners, and the local communities to identify and develop capacity building tools to support a further uptake of sustainable energy use in selected urban and rural areas in Africa known as "Living Laboratories" ("Living Labs" in short). The Living Labs are real-life test beds for innovative energy solutions, enabling the project to experiment in different environments. The urban and rural areas under discussion are as follows: Kisumu and Homa Bay, **Kenya**; Ga North Municipal District and Atwima Nwabiagya Municipality District, **Ghana**; Alicedale, **South Africa**; Waliranji-Mchinji, **Malawi** and lastly, Marrakech, **Morocco**.

This Capacity Building Tools and Updates report consists of five chapters. **Chapter 1** introduces the SESA project and gives an overview of the Capacity Building Tools and Updates report. **Chapter 2** presents an overview of the Capacity Building Plan detailing the capacity building gaps of each respective SESA Living Labs submitted under D2.1, provides an overview of the organization of the regional platforms and the capacity building gaps to be addressed in the regional training. **Chapter 3** describes the methodology that guides the implementation of the capacity building programme including the NUA platform that hosts the capacity building tools, an overview of the E-learning modules and the curriculum of the E-course 1 on Solar Energy and E-course 2 on Clean Cooking/ Waste to energy. **Chapter 4** describes more in details the training curricula and capacity building tools showing examples. **Chapter 5** describes a range of sister projects from which the capacity building tools can build on. The SESA project leverages synergies with several sister projects to develop its capacity-building tools. These projects cover a range of sustainable energy themes and offer valuable learning materials that can be repurposed for SESA's audience.

1.1. The SESA project

Smart Energy Solutions for Africa (SESA) is a collaborative project between the European Union and nine African countries (Kenya, Ghana, South Africa, Malawi, Morocco, Namibia, Tanzania, Rwanda and Nigeria) that aims at providing energy access technologies and business models that are easily replicable and generate local opportunities for economic development and social cohesion in Africa.
Through several local living labs, it is facilitating the co-development of scalable and replicable energy access innovations, to be tested, validated, and later replicated throughout the African continent. These solutions will include decentralised renewables (solar photovoltaics), innovative energy storage systems including the use of second-life electric vehicle batteries, smart microgrids, waste-to-energy systems (biomass to biogas), climate-proofing, resilience and adaptation, and rural internet access.
SESA is the result of a strong partnership between leading European and African universities, research centres, industry actors, local governments, knowledge and implementation organisations and networks. These will be strengthened via peer-to-peer exchange, policy dialogues, regional and international events among others.

SESA's objective is to mitigate climate change and avoid lock-in situations while improving access to sustainable energy under affordable and reliable conditions. The project aims to achieve a high level of replicability of actions. As part of an effort to go beyond the state of the art and maximise the project's impact, the project will co-develop innovations with local partners and cooperate closely with sister projects to exploit synergies.

Solutions that will be tested in this project have been selected based on their replication potential. Demonstration concepts aim to integrate several solutions to provide essential energy services to rural and urban communities and create easily replicable business opportunities for local entrepreneurs.

1.1. Objectives and scope of the document

The deliverable D2.2 provides an overview of the capacity building tools and methodologies that is being developed by SESA project partners under Work Package 2 (WP2): *Capacity building, city-to-city cooperation and professional development*. This deliverable is the result of Task 2.2 (T2.2) *Capacity tools and methodologies* that aims to offer capacity-building activities for professionals in the living labs and beyond, focusing on individual technical aspects related to the demonstration projects, business models, finance options, vision building, emerging ecosystems, and policy frameworks. The *Capacity tools and methodologies* developed under Task 2.2 (T2.2) are based on the Task 2.1 (T2.1) *Building SESA's capacity development framework* assessment, and inputs from the Task 1.1 (T1.1) *Toolbox for efficient and sustainable energy use*. Under this task, the curricula, case materials, slide decks, and videos that have been developed in T2.1 will be integrated in the SESA Toolbox (WP1).

The scope of this document will cover the conceptualization of the capacity building programme, the identified E-learning modules that are planned for each energy solution tested in the living labs as well as cross-cutting topics like Rural Internet Access, the platform that will host the e-learning courses, an overview of the regional platforms, and a database of experts from within the consortium. The guidelines and methodologies developed on different topics related to the demonstration projects, including climate proofing procedures, implementation guides on replicable energy technologies, maintenance guides of renewable energy solutions, all of which will be integrated in the SESA toolbox are detailed in Chapter 4 of this document.

2. The Capacity Building Plan

Developed under T2.1, the Capacity building plan highlights the present capacity, desired capacity, capacity gaps, and possible tools to fill these capacity gaps for the SESA Living Lab sites in Kenya, Ghana, Malawi, Morocco and South Africa. The findings for these countries were informed by desktop research, initial Living Lab engagements, interviews, and an interactive focus group discussion in the form of a "kick-off meeting".

The findings suggested various trends and themes related to the various countries' capacity gaps, needs and solutions within the area of sustainable energy development. The thematic areas identified are: policy and legal gaps that can be addressed to further support the energy solutions being implemented; stakeholders and community knowledge and awareness of the energy solutions being implemented; limited human capacity and technical skills to either use, monitor, service and/or upscale the energy solutions as well as limited access to finance to enhance and/or update sustainable energy solutions in the site areas and countries and lack of suitable infrastructure.

The various capacity gaps and proposed tools outlined were used to inform the Capacity Building Programme, contents included in the SESA toolbox, and a variety of other aligning deliverables and activities undertaken through the SESA project such as the policy barrier analysis, the development of the incubator programme and the organization of regional trainings. In addition, the findings shed light on the possible building blocks for capacity development in African cities and regions in relation to sustainable energy development. The summary of the Capacity building plan below highlights the decision-making process that was used to identify the content for the E-learning modules that are being developed in Task 2.2 through the *Capacity tools and methodologies* that are responding to the capacity needs identified in T2.1. The gaps identified will be comprehensively addressed by other Work Packages in the SESA project.

2.1 Gaps between present capacity and future desired skills

As part of the initial activities under WP2 of SESA, capacity gaps between present capacity and future desired skills were identified for the Living Labs in Kenya, Ghana, Malawi and South Africa under Task 2.1 (T2.1) to provide an overview of the existing technical capacity and identify areas for skills and knowledge development. The aim of this exercise is to streamline the implementation of capacity building programme to address the capacity gaps identified in the Living Labs.

Data collection was carried out by ICLEI Africa for which two approaches were taken through desktop research, engagements with Living Labs, semi-structured interviews and questionnaires, and an interactive focus group discussion with relevant public and private sector stakeholders in the form of a virtual kick-off workshop. The following sessions reported in D2.1 provide details on the identified gaps from each of the living labs and proposed tools and modules to fill these gaps:

2.1.1 Kenya Living Lab

Table 1: Capacity gaps identified for the Kenya Living Lab

Thematic area	Gaps between present capacity and future desired skills	Tools and training modules to fill these gaps
Political and legal	Lack/delay in formation or adoption of adequate legal and policy frameworks by county administration and assembly	Workshops with decision-makers on approaches for effective integration into revised development plans for target counties
	Lack of policy formulation expertise and efficiency	Dialogue with decision-makers on the relevant renewable energy licensing to unpack and enhance procedures and processes
	Lack of expertise and efficiency around energy licensing	Dialogues and/or training sessions on monitoring and evaluating processes for renewable energy technology projects being implemented at the local level
	The Kisumu County Integrated Development Plan II (2018-2022) and the Homa Bay County Integrated Development Plan II (2018-2022) coming to an end.	Learning session(s) for Living Labs and/or local innovators unpacking the basics around small business development in relation to sustainable energy technologies

Knowledge and awareness	Lack of sufficient knowledge on renewable energy technologies. This can likely result in reduced buy-in, poor usage and/or a lack of capacity to maintain the energy technology systems	Communications products and/or e-learning module to raise awareness and enhance understanding on the benefits and opportunities of the renewable energy technology Communications products briefly explaining the site-specific solar PV technologies (what they are and the associated benefits) in Kisumu and Homa Bay in a visual and easy to understand manner Explain the site-specific technologies (Solar PVs) to users through communications products or through trained members of the community
Human capacity and skills of community	A lack of understanding on Solar PVs and more specifically, the solar PV hubs functions	Communications products briefly explaining the site-specific solar PV technologies (what they are and the associated benefits) in Kisumu and Homa Bay in a visual and easy to understand manner Training innovators on the operation and maintenance procedures required in relation to the Solar PV hubs Communication products explaining climate change causes and impacts in Africa
Skills of local innovators	Mapping of possible policy, strategy and/or plan entry points for replicating energy solution	Innovator training, workshops and videos on solar PV technology utilisation and associated benefits in a visual and easy to understand manner Learning session(s) for Living Labs and/or local innovators explaining the basic knowledge around small business development in relation to sustainable energy technologies
Access to finance	Develop financial instruments and technical assistance to improve fiscal access	Awareness-raising and technical assistance to financial institutions and individuals to increase access to finance to fund solar PV investment Financial instruments developed for increased access to finance to fund solar PV investment

2.1.2 Malawi Living Lab

Table 2: Capacity gaps identified for the Malawi Living Lab

Thematic area	Gaps between present capacity and future desired skills	Tools and training modules to fill these gaps
Policy and planning	Development of enabling environment	Institutional training and awareness-raising for supporting energy resilience at different scales
Knowledge and awareness	Lack of sufficient knowledge on renewable energy technologies (including BioCookers), climate change and deforestation	Communications products and/or e-learning modules to raise awareness and enhance understanding of the benefits and opportunities of the renewable energy technology Communication products explaining climate change and deforestation causes and impacts in Malawi
Human capacity and skills of community	Development of BioCooker technology understanding and utilisation	Training on new/innovative ways to make biomass briquettes for BioCookers in Waliranji-Mchinji Explain the site-specific technology's (BioCooker) maintenance aspects to a user through communications products or through trained members of the community
Skills of local innovators	Development of training for BioCooker production	Explain the site-specific technology's (BioCooker) maintenance aspects to a user through communications products or through trained members of the community

2.1.3 Ghana Living Lab

Table 3: Capacity gaps identified for the Ghana Living Lab

Thematic area	Gaps between present capacity and future desired skills	Tools and training modules to fill these gaps
Political and legal	Despite significant efforts to mainstream sustainable energies into national policies, the extent to which such energies are integrated into local government plans in Ghana remains unclear	Policy review and integration working session with selected national and local authorities
Knowledge and awareness	There is a lack of public awareness; a lack of information about the costs and benefits of renewable energy technologies; as well as public acceptance of renewable energy technologies	Communications products and e-learning modules to raise awareness and enhance understanding of the benefits and opportunities of the renewable energy technology Communications products briefly explaining the site-specific technologies (what they are and the associated benefits) in Ga North and Atwima Nwabiagya in a visual and easy to understand manner
Human capacity and skills	There is a lack of technical skills to operate and maintain renewable energy technologies, project development skills as well as a lack of adequate training centres	Training selected community members (with guiding documents) on the operation and maintenance procedures required as well as various project development aspects
Access to finance	Access to finance and long-term capital to access resources to fund waste-to-biogas and solar technology	Awareness-raising and technical assistance to financial institutions and individuals to increase access to finance for waste-to-biogas and solar power systems Learning session(s) for Living Labs and/or local innovators presenting the basic information concerning small business development in relation to sustainable energy technologies

2.1.4 South Africa Living Lab

Table 4: Capacity gaps identified for the South Africa Living Lab

Thematic area	Gaps between present capacity and future desired skills	Tools and training modules to fill these gaps
Political and legal	Development of policy on sustainable energy technology or electrification Introduction to EVs and training on how the technology works as well as the potential benefits Policy and planning mechanisms that can support these technologies at the local level Development of second-life EV regulations	Online capacity-building workshops on ways in which to further support sustainable energy and electric vehicles (such as support programmes, subsidies etc.) Case study information/technical support on regulations on EVs and second-life battery usage
Knowledge and awareness	Community knowledge on renewables operation, maintenance and benefits improved	Awareness-raising/ capacity building/roadshows/infographics on sustainable energy technology and the associated impacts
Human capacity and skills of community	Community gains experience and understanding of how technology works Community gains experience and understanding on how technology can be used for current activities Community gains experience and understanding on how to operate and, to a certain extent, maintain technology Community gains understanding of the benefits of the technology and potential opportunities	Introductory training to EVs and related infrastructure In-person demonstrations and training for the community in local languages Driving training for micro utility EVs
Skills of local innovators	Rural local innovators gain understanding and experience with relevant technologies Demonstration of second-life EV battery usage	In-person training on technologies Site visits to companies where technologies are used Incubation and mentoring of companies Pilot projects and monitoring of second life EV battery usage Computer training including basic website design

Finance	Development of supportive financial mechanisms for respective technologies	Online workshops on financial mechanisms and tools for respective technologies Learning session(s) for Living Labs and/or local innovators presenting the basic information around small business development in relation to sustainable energy technologies Expansion of entrepreneurship programme to include sustainable: 1) agriculture, 2) tourism (including catering, restaurant, tours, clothing, beading, accommodation), and 3) transportation (shared vehicles) business models

2.1.5 Morocco Living Lab

Table 5: Capacity gaps identified for the Morocco Living Lab

Thematic area	Gaps between present capacity and future desired skills	Tools and training modules to fill these gaps
Political and legal	Development of enabling environment	Institutional training and awareness-raising to support energy efficiency and resilient mobility at different scales and across sectors
Knowledge and awareness	Development of education and awareness on solar, electric mobility and second-life battery technology Develop press media's knowledge of renewable technologies	Awareness-raising through events, exhibitions, education campaigns and explanatoryvideos on solar, electric mobility and second-life battery technology, benefits and opportunities targeting national and local government, community stakeholders, and financial institutions Awareness-raising on climate change causes and impacts on Africa through explainer videos and visual posters Awareness-raising and training targeting journalists and media on renewable technologies functioning, utilisation, benefits, and opportunities
Human capacity and skills of community	Development of solar, electric mobility and second-life battery technology understanding and utilisation	Training on solar, electric mobility and second-life battery technology, benefits and utilisation through in-person demonstrations, community user training and/or ToT trained members of the community

		User manuals developed for community users Dialogues and/or training sessions on monitoring and evaluating processes for renewable energy technology projects being implemented at the local level
Skills of local innovators	Develop training for companies and small business stakeholders on implementing a solar and electric mobility business model	Innovator training and workshops on solar, electric mobility and second-life battery technology, mechanics and repairs Innovator training modules developed for workshop training
Access to finance	Develop financial instruments and technical assistance to improve fiscal accessibility	Awareness-raising and technical assistance to financial institutions and individuals to increase access to finance for solar, electric mobility and second-life batteries Learning session(s) for Living Labs and/or local innovators unpacking the basics around small business development in relation to sustainable energy technologies
Infrastructure	Develop capacity of local innovators to safely manage end-of-life batteries	Training materials required for EVs, second-life battery operations and end-of-life management

2.2 Regional Platforms

SESA Regional platforms have been established to organise the regional teams and support partners and coordinate with other relevant regional projects to maximise the potential for take-up and replication of the energy innovations tested in this project. A common implementation methodology will be developed (T4.2- Co-develop demonstration actions), with the lead-partners for all regional teams. This will form the basis of detailed implementation plans which include all the activities needed for preparation and execution of the demo, technical and operations issues, business model adaptation, stakeholder engagement and replication.

SESA is working closely with local, regional and national decision-makers, industry and local businesses to co-develop innovative energy solutions that fit into living labs' local context but are also scalable and replicable. Co-development partnerships are being established during the initial phase of the project involving the innovation experts and local teams from within the consortium along with the host local authorities and innovators. Within the project, partner cities and counties will form regional partnerships, within the preferred regional platform supported by thematic experts, to ensure targeted work and expert exchange on local integration of specific solutions.

Thematic experts in relevant fields of application from Europe and Africa work within the regional platforms to provide insights and guidance to the co-development process. The experts involved

are being engaged to share their specific expertise and experience and provide technical advice to support the living labs and to assess the feasibility, costs and benefits, good performance during their entire lifetime and replicability of innovative measures. The direct involvement of international initiatives, other networks and initiatives will ensure a high level of visibility and replication of the innovations tested in this project.

The identified thematic areas include:

- **Solar energy**: Kenya (demonstration), Ghana (validation), South Africa (validation), Morocco (validation), Namibia (replication), Tanzania (replication), Nigeria (replication), Rwanda (replication),
- **Clean cooking/ Waste to energy (Biogas for cooking)**: Kenya (demonstration[1]), Ghana (validation[2]), Malawi (validation), Rwanda (replication)
- **Electric Mobility**: Kenya (demonstration), South Africa (validation), Morocco (validation)

Regional platforms have been established to organise the regional teams, support partners in implementation and coordinate with other relevant regional projects to maximise the potential for take-up and replication of the energy innovations tested in this project.

Regional platforms based on geographic regions include:

- **North and West Africa region**: Ghana (validation), Morocco (validation), Nigeria (replication)
- **East Africa region**: Kenya (demonstration), Tanzania (replication), Rwanda (replication)
- **South Africa region**: Malawi (validation), South Africa (validation), Namibia (replication)

The regional platforms are organised based on both thematic topics, and on geographic location. The meetings for the regional platforms can be held monthly for the thematic groups to enable the development of the implementation plans and quarterly for the geographic groupings to facilitate capacity building, enable sharing of ideas and strategies. These platforms will work in close cooperation with the SOLUTIONSplus project and other relevant projects and partners, facilitate knowledge exchange, capacity building and replication with and across the partner regions.

The Regional Platforms form the basic structure through which the regional training and exchange T2.4 will be carried out. The first regional training of 2023 will be carried out in the North and West regional platform.

2.3 Regional Training

The regional training and exchange (T2.4) will be facilitated linking the capacity building directly to the other key activities of the project, such as the Technical and business partnerships, models and implementation plans (WP3), the demonstration actions under Comparative demonstration and replication actions (WP4) and the Policy development, institutionalisation and integration in local and national plans (WP5). This task will be facilitated within the framework of the regional platforms (T4.1) and link directly to the demonstration actions (T4.2). The task will also establish regional training and innovation centers for capacity building and train-the-trainer activities as well as start-up and living lab support centers, which will multiply the number of individuals trained by the project directly. Through training and workshops that will be delivered through face-to-face and online using Technology Enhanced Learning (TEL), the regional team will exchange on relevant topics, challenges and opportunities related to the innovations tested in the Living Labs. The

[1] There is no test case that is being carried out by WeTu on clean cooking or waste management
[2] They did not include a budget for setting up of the project, so they will wait for WP3 SME selection

regional exchange will allow for a synergistic giving and receiving of knowledge, skills and experience between the project partners and local-level actors in the region.

The regional team will engage Living Lab partners and seek support from thematic experts in training directly related to the demonstration activities. SESA aims at directly train at least 500 experts, officials and practitioners in the short term. The ripple effect is expected to generate 100 new stable jobs 5 years after the project ends (at least 10 each at the at least 10 companies supported by SESA). The regional training will be coordinated by the regional support teams (WP4) and other international partner projects. Below is breakdown of the country specific gaps that the regional training will address.

Table 6: Country specific gaps for the regional training

CONTEXT OF EACH PARTNER COUNTRY AND IDENTIFY KEY THEMES FOR THE REGIONAL CAPACITY BUILDING		
COUNTRY	**COMMON GAP**	**SPECIFIC GAP**
KENYA	1. Insufficient knowledge of sustainable energy technologies (poor usage and/or lack of capacity to maintain the energy technology systems).	1. Lack of technical expertise and inefficiency in formulating adequate renewable legislation at the local level. 2. Insufficient data on the energy resource use and base in and around the Lake Victoria basin region. 3. Lack of data showcasing the current energy supply and demand in Kenya. 4. The need for investor-friendly laws in Kenya to increase financiers to Venture into renewable energy opportunities in Kenya.
MALAWI	1. Lack of education on renewable energy technologies, climate change, and deforestation at the community level.	1. Change in cooking approaches and behaviors. 2. Level of illiteracy to read and write. Limited knowledge among local innovators and community members on ways of making biomass briquettes for Biocookers.
GHANA	1. Involvement of local people and institutions in planning and implementation sustainable energy policies 2. Misinformation on Smart energy technologies (face-to-face education, online training schemes, and information videos might be helpful) 3. Lack of technical skills to operate and maintain renewable technologies and project development skills.	1. Access to finance and long-term capital. 2. Inadequate training centers in the local site areas.
SOUTH AFRICA	1. Lack of information and education or training (workshops, dialogues, community meetings, and	1. Exposure to and experience working with solar PVs, battery systems, and EVs as alternative energy sources on how technologies can be installed, operated, maintained, and utilized effectively.

	awareness campaigns on Smart energy).	2. Insufficient mechanisms to access funding (improve entrepreneurial skills, including knowledge to access finance for renewable initiatives).
MOROCCO	1. Education and awareness-rising campaigns with the target groups are necessary to develop their knowledge to a high level. 2. Establishment of comprehensive and targeted training on mainstream renewable technology (administrative and technical aspects).	1. Need to train selected stakeholders/companies on implementing effective e-mobility business models. 2. Lack of competency to use and maintain the second-hand li-ion battery systems and the scooters by the women from the target urban site as well as their license to comply with Moroccan transport law. 3. Sustainable business models and small charge fees to support responsible use and initiative by users and ensure any external periodic maintenance costs can be covered

The table below shows the timeline activities for the regional training which will be carried out in the respective regional platforms. As per the timeline below drafted under T 2.4, first regional training is set to take place in Ghana in October 2023 targeting the North and West African regional platform.

	Timeline of Activities	**Proposed Period**	
		Start	**End**
1	Breaking down and converting Capacity gaps identified in Task 2.1 into topics/areas a. Kenya b. Malawi c. Ghana d. South Africa e. Morocco		10/03/2023
2	Review of training needs topics/areas compared to topics developed in Task 2.2 to prevent duplication.	13/03/2023	17/03/2023
3	Develop training and workshop manuals and communication materials based on identified gaps for each region (or country?) or topic a. Kenya b. Malawi c. Ghana d. South Africa e. Morocco	20/03/2023	Until end of the project
4	Review of developed modules and communication manuals	2/05/2023	12/05/2023
5	Converting of training and workshop manuals into online resources for NUA campus a. Kenya b. Malawi c. Ghana d. South Africa e. Morocco	15/05/2023	Until end of the project
6	Online capacity building training using Infospots and NUA campus aimed at bridging gaps	29/05/2023	Until end of the project

7	Develop installation (design, construction and maintenance) manual for the demonstration and replication activities a. Kenya b. Ghana c. South Africa d. Malawi e. Morocco	03/07/2023	Until end of the project
8	Convert the design, construction and maintenance manuals into online training system/tool kids to be hosted on NUA campus website and other online channels	04/09/2023	Until end of the project
9	Organised face to Face Capacity building workshop in Each Region through the Regional Platforms West Africa (Ghana) North Africa (TBC) South Africa (TBC) East Africa (TBC)	Oct 2023	Until end of the project
10	Develop a framework for academic collaborations between universities within the consortium to develop academic programmes/ publications. a. Selection of specific sustainable energy topics b. Development of video lectures c. Collaboration in research publications	Oct 2023	Until end of the project
11	Link up with local authorities to contribute developing a policy guideline to promote the replication of sustainable energy solutions. a. Kenya b. Ghana c. South Africa d. Malawi e. Morocco f. Namibia g. Tanzania h. Rwanda i. Nigeria	Nov 2024	Until end of the project

3. The Capacity Building Programme

3.1 The NUA Campus Platform

The SESA capacity building programme is an integrated e-learning programme hosted by the **NUA Campus**[3] which is an e-learning platform connected with the Urban Living Labs Centre for the transformation, focusing on urban mobility, energy, and resource sectors.

Co-hosted by MIT, TU Berlin (SESA partner), the Wuppertal Institute (SESA partner) and UN-Habitat (SESA partner), the platform is specifically designed to facilitate online and self-paced learning

[3] https://nuacampus.org/

modules for a wide audience that ranges from students to civil society organization with the aim of developing skills necessary to tackle the main challenges identified in the New Urban Agenda[4]. It provides free online courses and webinars to urban practitioners.

Thanks to the platform's structure, SESA offers personalized courses for each one of the technologies. Video, slides, list of further readings and useful links are made available for each lesson to anyone with free registration to the platform. In particular, the possibility to verify their understanding via some closed questions and to get a formal recognition of the participation to the course, was mentioned by Living Lab representatives as an important and motivating factor in the African context. Although registration may be perceived as a barrier in some cases, the consortium decided to opt for this solution in order to offer the possibility for interested individuals to keep track of their progresses, through quizzes, and get a certificate of in case of successful compliance of all courses. Moreover, the registration will also allow SESA team to monitor and track participation, identify the topics of most interest and potentially detect any problem in a timely manner. The platform also offers the possibility to pose questions on a specific lesson to the identified expert in charge of that specific lesson to provide, in a lecturer format, the support needed to better understand the content.

Additionally, storing the learning material produced through the SESA programme will enable the courses to be available after the completion of the project to a wider audience of interested cities and stakeholders outside the project scope.

The SESA e-learning courses will also be made available on the SESA YouTube channel and linked to the SESA Toolbox (together with their respective PowerPoint presentation).

Courses will be actively promoted on well-established and widely used dissemination channels e.g., social media as well as through the SESA partners to attract a wide audience.

3.2 The E-learning modules

The E-learning modules consist of targeted capacity-building activities for professionals in the living labs, focusing on individual technical aspects related to the demonstration projects including business models, finance options, vision building, emerging ecosystems, and policy frameworks.

The E-learning modules that are being developed for each energy solution tested in the living labs as well as cross-cutting issues, consist of:

1. 1 webinar
2. 1 distance-learning sessions
3. 1 thematic reader
4. and supported by off-line available animations/videos

Target audience: The course is primarily designed for policy makers, technicians and professionals working in the Living Labs but aimed to provide a solid knowledge basis for any stakeholder involved in energy. The E-learning modules takes the technical perspective in response to the identified need to gain a better understanding of the technologies in use. Yet, the courses do not imply a specific technical background and can be useful for policy makers since better understanding of the technology will contribute to facilitating holistic enabling policies. Moreover, the policy aspects are in focus in the live discussion organized over the SESA webinars where representatives from local and national governments are invited to share their experience together with technical experts also from other EU initiatives working on the same topics as well as relevant

[4] http://habitat3.org/wp-content/uploads/NUA-English.pdf

stakeholders such as international institutions. The course is openly available online to all the public (beyond project partners).

Each E-learning module is structured in lessons and has one corresponding webinar; an open discussion with policy makers, technicians and businesses. Each module includes:

- An introduction video, to present the course's aim, content and activities, and established a first moment of interaction with the students,
- PowerPoint presentations for each lesson, with corresponding video lectures,
- Complementary thought-provoking content and good examples,
- One webinar and moderated forum discussions: instances of direct interaction with course participants with a particular attention to policy and funding/financing aspects related to the uptake of the specific technologies.
- Tasks/ assignments/ quizzes: questions for students to reflect module contents on.
- Additional materials: references, factsheets, tools, materials from other projects, papers, etc.

All participants enrolled in the course via the NUA campus platform can pose questions to the organizers via a comment function and all experts that were engaged in creating the content agreed in being available to address any doubt or request on their respective lesson.
To gain a better understanding of the user experience, SESA will create a short evaluation questionnaire that will be randomly proposed to the enrolled users.

3.3 E-course 1: Solar Energy

Introduction

Objective: This is the first course of the SESA E-Learning Programme, which focuses on Solar Energy. The course covered the basics of electricity, components of PV system, and the solar PV technology. The course aimed to contextualise the solar training and renewable energy education with the needs of local experts working in Africa. It also provided an overview of the solar energy ecosystem, mapping relevant sectors, stakeholder needs and operator requirements. Finally, the course provided good practice examples for policy measures and incentives to support Solar energy implementation in Africa with respect to experiences in the Living Labs.

Course Timelines

The Solar Energy E-learning course went live in March 2023.

Format and content

The e-course is stored on YouTube on this link and in the NUA Campus platform on this link.

Foundation/ Stand Alone Materials

Kick-off Webinar: Learning Programme Kick-off Session	Kick off	1) Intro to SESA 2) Introduction to SESA capacity needs assessment and knowledge gaps analysis 3) Introduction to Learning Programme

Unit	Course Module
Intro Video	Basics for solar energy and PV systems (+ adaptation)
Lesson 1	Sizing of solar electrification systems
Lesson 2	Installations, Operations
Lesson 3	Maintenance and Safety

Lesson 4	Solar energy applications (Productive uses)
Lesson 5	Suitable condition for PV installations
Lesson 6	Solar PV system designs exercise
Webinar 2 / Practice Session	Open discussion with policy makers, financing institutions (Africa Development Bank) and businesses on the potential of PVs

All time course students: 57 students
Course passed lessons (progress): 17.11%
Course passed quizzes: 23.56%

3.4 E-course 2: Clean Cooking/Waste to Energy

Introduction
This is the second course of the SESA E-Learning Programme on clean cooking and waste to energy.
Objective: This course will focus on cleaner fuels, energy-efficient modern stoves and energy recovery from waste. Finally, the course will provide good practice examples for policy measures and incentives to support clean cooking and waste to energy.
Course Timelines
The Clean Cooking/ Waste to Energy E-learning course went live in May 2023.

Unit	Course Module
Intro Video	Basic clean cooking concepts
Lesson 1	Treatment of Organic Waste: Anaerobic Digestion
Lesson 2	Sourcing and production of waste-to energy system
Lesson 3	Technology options for clean cooking solutions
Lesson 4	Installations, Operations for clean cooking solutions
Lesson 5	Maintenance and Safety for clean cooking solutions
Lesson 6	Suitable condition for waste to energy installations
Lesson 7	Business models and delivery models for clean cooking solutions
Webinar 2 / Practice Session	Open discussion with policy makers and businesses on the potential of waste-to-energy

Format and content
The e-course is stored on YouTube on this link and in the NUA Campus platform on this link.

All time course students: 18 students
Course passed lessons (progress): 17.9%
Course passed quizzes: 12.35%

The project team will be continuously working on developing e-courses for the other topics, with launch dates and specific topics to be further defined. These include:

- 3rd e-course: Electric Mobility

- 4th e-course: Second Life EV Batteries
- 5th e-course: Rural internet access
- 6th e-course: Smart microgrid and system integration

Given the level of planning and work needed for the organisation of these courses, some of these courses will be rolled out in 2024. The partners involved in the planning will roll-out the courses to align with other capacity building activities including the Regional Trainings within the Regional Platforms.
Going forward the topic of access to finance for energy projects will continue to be main streamed into the E-course development to sufficiently address this knowledge gap complementing and piggybacking on the work and experience SESA is developing under WP3 and WP5. To facilitate this synergy, the SESA partners leading on WP3 are strongly engaged in the design of the webinars.

4. Capacity Building Materials

Taking the results knowledge gap analysis as starting point (T2.1), the SESA capacity building programme was shaped up following an iterative process. Aligned with the actions in the Living Labs, solar energy, clean cooking, waste to energy, electric mobility, second life EV batteries, smart microgrid and system integration and rural internet access are the core solutions which will be deepened each one in a dedicated course. A course comprises of 5-8 lessons available online and with no learning duration restriction, for self-paced learning and the possibility to test the understanding via quiz and get a certificate.

The SESA training curricula and capacity building material includes training material related to local and national policy and related issues. These materials include slide decks, presentations, module outlines, handouts, quizzes, key background material, videos, webinars, which will be used freely for non-profit academic and professional training with attribution to the SESA project. These training materials will be structured along the main thematic areas identified above. Examples (screenshots) of the educative material are showcased below:

Presentations

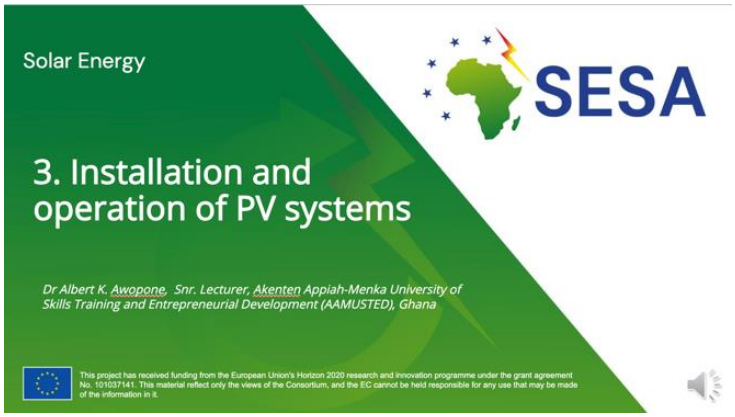
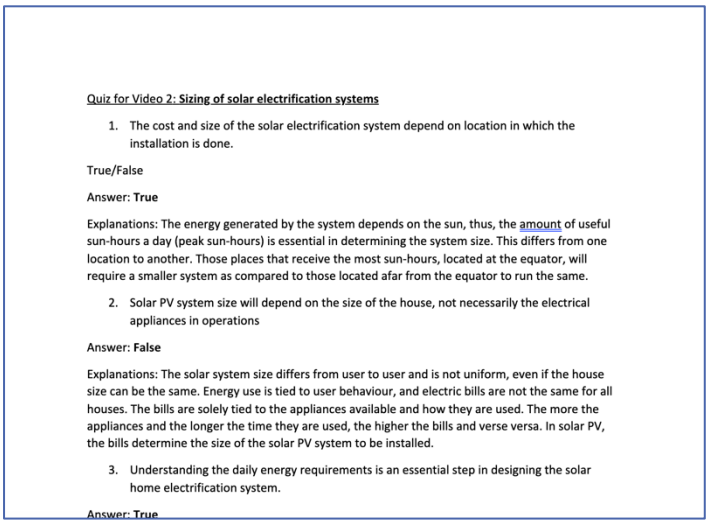


Figure 1: Presentations from the E-learning program

Figure 2: Presentation example from the E-learning program

Quizzes



Quiz for Video 2: **Sizing of solar electrification systems**

1. The cost and size of the solar electrification system depend on location in which the installation is done.

True/False

Answer: **True**

Explanations: The energy generated by the system depends on the sun, thus, the amount of useful sun-hours a day (peak sun-hours) is essential in determining the system size. This differs from one location to another. Those places that receive the most sun-hours, located at the equator, will require a smaller system as compared to those located afar from the equator to run the same.

2. Solar PV system size will depend on the size of the house, not necessarily the electrical appliances in operations

Answer: **False**

Explanations: The solar system size differs from user to user and is not uniform, even if the house size can be the same. Energy use is tied to user behaviour, and electric bills are not the same for all houses. The bills are solely tied to the appliances available and how they are used. The more the appliances and the longer the time they are used, the higher the bills and verse versa. In solar PV, the bills determine the size of the solar PV system to be installed.

3. Understanding the daily energy requirements is an essential step in designing the solar home electrification system.

Answer: **True**

Figure 3: Quiz example from the E-learning program

Videos

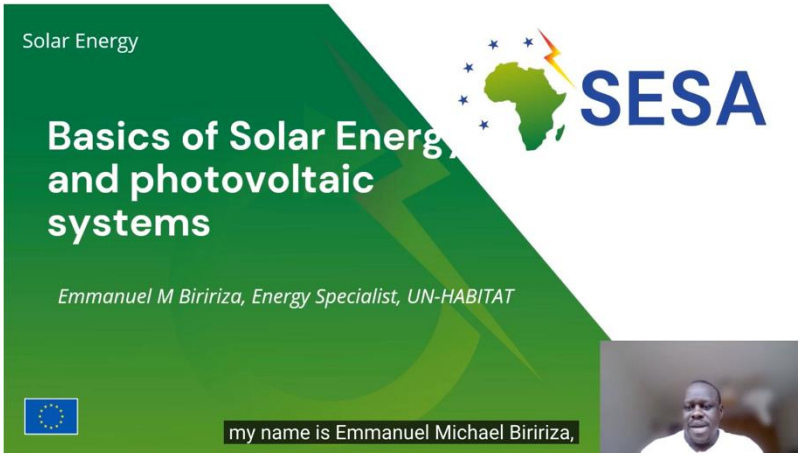


Figure 4: Video example from the E-learning program

5. Sister projects

The capacity building tools are built on a range of projects. Learning materials developed from sister projects can be reused and repackaged for the SESA audience depending on the subject. For example, the SOLUTIONSplus project has developed extensive content on E-mobility that can be reused in the SESA Project depending on need and relevance. Moreover, in tandem with T 6.3 an open dialogue with partners from these projects is kept with the purpose of informing each other on relevant outcomes and respectively contribute to enrich the learning offer. This includes cross referencing to materials produced (eg reports, guidelines and tools) as well as contributing to each other's events.
Below is a list of projects the SESA project draws synergies from.

GEF Global E-Mobility Programme (https://www.unep.org/gef/)
A new GEF Global E-Mobility Program launched at the COP25 climate summit will help an initial set of 17 developing countries deploy electric vehicles at scale, in support of improved air quality and reduced fossil fuel dependency. The $33 million program, launched in Madrid in coordination with the European Commission's new E-Mobility Solutions Plus Project, represents the first global coordinated effort to promote and accelerate the uptake of electric mobility in developing countries. The program will help governments establish supportive policies to enable technology transfer, private sector engagement, and access to commercial finance for the introduction of fleets of electric buses, two-wheelers, three-wheelers, trucks, light duty vehicles, and private vehicles. It will also create three regional platforms to support the transition to electric mobility in Africa, Asia and the Pacific, and Latin America and the Caribbean. This work will be closely tied to the GEF Sustainable Cities Impact Program.

Under Task 6.3 Strategy on cooperation with sister projects, a mapping exercise was conducted to identify and cluster projects working on similar themes as the SESA project under Green Deal Projects Working Group on Clean Energy. The purpose of this strategy is to guide the cooperation of the SESA project with other EU funded projects with an aim of maximizing synergies in the field of sustainable energy in Africa. The cooperation will strengthen potential cross linking project goals and deliverables. The aim of this is to find more direct ways of linking project partners to maximize the benefits of the exchanges and the capacity building. Below is a list of the sister projects that can contribute to the SESA capacity building.

SOLUTIONSplus (www.solutionsplus.eu)
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 organizations 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 is implementing city level demonstrations to test different types of innovative and integrated e-mobility solutions in Vietnam, Philippines, Nepal, Rwanda, Tanzania, Ecuador, Uruguay, Spain, China and Germany. The demonstrations are complemented by a comprehensive toolbox, capacity development and replication elements. SolutionsPlus and SESA project will draw synergies from electric mobility demonstrations and regional capacity building on electric mobility.

This project builds on the Urban Electric Mobility Initiative, which was launched by UN-Habitat and the Wuppertal Institute at the UN Climate Summit 2014. It also closely cooperates with a sister project funded by the Global Environment Facility (GEF) and managed by the International Energy Agency (IEA) and UN Environment. Together the two projects create a joint global urban e-mobility programme that will significantly boost the development of innovative solutions, their replication and scale-up. Through the regional training platforms, global working groups and local city support teams, the partners will develop highly effective and innovative approaches to urban e-mobility

ensuring that mobility systems and interventions deliver on the Paris Agreement, meet the Sustainable Development Goals and address the New Urban Agenda.

Energy Access in Urban and Rural Africa (ENERGICA)
ENERGICA's objective is to demonstrate the efficient implementation of renewable energy technologies to match local contexts' needs. To do this, the project is focusing on demonstrating innovative nano-grids for renewable production of water and food in Madagascar, Sierra Leone and Kenya including a biogas and water purification system for energy, water and food fertilizer production in Sierra Leone; and solar powered electric mobility for moto taxis (boda-bodas) in Kenya. The project also has capacity building, replication, scaling-up and networking as well as communication, dissemination, and exploitation elements. The ENERGICA and SESA projects can benefit from synergies in the Off-grid Energy (Solar energy), Clean cooking (Waste to energy (Biogas for cooking) and Electric Mobility (Second life EV (Li-ion batteries) batteries themes as they are all addressed in the two projects. For example, in Kenya, both projects are implementing electric mobility projects in the Western region with multiple use of off grid solar.
Website: http://www.energica-h2020.eu

Renewable energies for Africa: Effective valorization 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 demonstration of innovative, reliable and adapted sustainable energy solutions based on the valorization of biomass wastes from agriculture and the food industry through biomass gasification. The expected products are biochar from the gasifier and valuable fertilizer 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. As with other projects, the RFFECT Africa project also has capacity building and dissemination elements. The REFFECT AFRICA project and the SESA project will most usefully benefit from tapping into synergies on the Off-grid Energy (Solar energy). Both projects have off grid solar implemented in Ghana through AAMUSTED
Website: http://reffect-africa.eu

Sustainable Off-grid solutions for Pharmacies and Hospitals in Africa (SophiA)
The project seeks to provide for sustainable energy supplies and water free of bacteria and viruses for rural and remote health facilities in Africa. This will be done through ensuring access to clean energy, drinking water and cooling in rural Africa. Demonstration sites will be in remote hospitals of Burkina Faso, Cameroon, Malawi and Uganda. The project objectives will be achieved through technology conception, prototyping and product development, demonstration, dissemination, communication and capacity building. SophiA and SESA will benefit from synergies within off grid energy theme where both projects are implementing containerized off grid solutions. Both projects are implemented by uYilo e-mobility Programme.
Website: https://sophia4africa.eu/

SteamBioAfrica
The project is focused on creating a commercially viable technology solution that will stimulate the harvesting of invasive woody biomass. This builds up on the original SteamBio technology and seeks to upscale, adapt, and prove the technology to confirm is 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. SteamBioAfrica and SESA projects would benefit from drawing synergies in the Waste to Energy theme where SESA is exploring using briquets of residual agricultural byproducts while SteamBio Africa is exploring converting invasive bush into clean-burning biofuel.

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

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, and assessing Impact, as well as replication. LEAP-RE aims to reduce fragmentation by aligning existing bilateral and multilateral frameworks and jointly implement research, innovation, and capacity-building activities. 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.

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

Annex I – Thematic experts and trainers

The experts and trainers come from the following organisations:

1 ICLEI European Secretariat (ICLEI ES), Germany
2 Aalborg University (AAU), Denmark
3 Akenten Appiah-Menka University of Skills Training and Entrepreneurial Development, Kumasi (AAMUSTED), Ghana
4 Basic Internet Foundation, Kjeller (BIF), Norway
5 Blekinge Institute of Technology (BTH), Sweden
6 Energy and Livelihoods for Communities (ELICO) Foundation, Tanzania
7 F6S Network Ireland (F6S), Ireland
8 Green Energy Park (GEP), Morocco
9 Going Green (GG), Malawi
10 ICLEI e.V.- Local Governments for Sustainability (World Secretariat) (ICLEI WS), Germany
11 ICLEI Africa (ICLEI AS), South Africa
12 Technische Universität Berlin (TUB), Germany
13 Leitat Technological Center (LEITAT), Spain
14 Make It Green Solutions (MIGS), Sweden
15 Metanogenia, S.L. (MET), Spain
16 Nelson Mandela University – uYilo eMobility Programme (NMU), South Africa
17 Namibia University of Science and Technology (NUST), Namibia
18 Stiftelsen the Stockholm Environment Institute (SEI), Sweden
19 Smart Innovation Norway (SIN), Norway
20 Siemens Stiftung (SIEMENS), Germany
21 Stichting Cenex Nederland (CENEX NL), Netherlands
22 Research Institutes of Sweden AB (RISE), Sweden
23 Tecnalia (TEC), Spain
24 University of Rwanda (UR), Rwanda
25 Danmarks Tekniske Universitet (DTU), Denmark
26 UN Environment (UNEP), Kenya
27 UN-Habitat (UNH), Kenya
28 Urban Electric Mobility Initiative (UEMI), Germany
29 WE!Hub Victoria Limited (WeTu), Kenya
30 Wuppertal Institute for Climate, Environment and Energy (WI), Germany

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