

IRENA's support to Eastern Africa Regional Model Analysis & Planning Support Programme

Concept note and agenda

Workshop #3 – Creating base national models for power supply planning SPLAT-MESSAGE

Venue: Entebbe, Uganda

23 – 27 June, 2025

Background

The **Eastern Africa Regional Model Analysis & Planning Support Programme** is a strategic initiative designed to strengthen the power sector across East Africa through comprehensive capacity building in long-term energy planning. Recognizing this as a key priority, the Eastern African Power Pool (EAPP) identified capacity building in its ten-year strategic plan (2018–2027). In collaboration with AUDA-NEPAD, EAPP has contributed to the development of the Continental Power System Master Plan (CMP), enhancing the General Secretariat's ability to integrate accurate and up-to-date data into a regional energy roadmap framework.

The **CMP serves as a framework** for aligning the long-term electricity sector strategies of regional power pools and acts as a blueprint for establishing the African Single Electricity Market (AfSEM) by 2040. In the EAPP region, in 2023 power generation capacity is dominated by natural gas plants at 65% (54 GW) and large hydro at 21% (17.8 GW). However, CMP results indicate a shift towards a more diversified energy mix, with a growing emphasis on renewable energy opportunities. Increased regional integration is expected to further enhance renewable energy expansion, resulting in lower system unit costs (~0.067 USD/kWh) and reduced CO₂ emissions intensity (0.07-ton CO₂/MWh) compared to the baseline scenario¹. To ensure alignment between the EAPP Regional Master Plan and the CMP, institutional capacity building remains a fundamental requirement.

The CMP is groundbreaking in two ways. First, all technical work-including scenario definition, data collection, modelling, and analysis is led by African experts, with support from global partners. This **ensures both ownership and knowledge transfer**. Second, the CMP provides a unified strategic framework for the five African power pools, guiding regional energy planning and aligning with continental aspirations. **The CMP development follows a phased approach:** Phase I focused on developing the CMP baseline study; Phase II built African expertise and established a CMP platform for data management and modelling; and, the recently launched, Phase III emphasizes capacity building at regional and national levels. This approach fosters alignment and ownership of planning processes while facilitating investment in power generation and transmission infrastructure.

Building on the CMP, this programme leverages synergies with ongoing regional **initiatives to strengthen energy planning capacity**. It is further supported by key partners, including the International Atomic Energy Agency (IAEA), AUDA-NEPAD, Get. Transform, the World Bank, and EU-TAF, whose active contributions of expertise and resources enhance technical assistance and knowledge exchange. By aligning with regional efforts and fostering collaboration, these partnerships contribute to comprehensive regional power sector studies and analyses, promoting sustainable energy solutions and long-term energy security.

To achieve EAPP's strategic goals, the programme is designed **to enhance institutional capacity of training member utilities and the EAPP Planning Committee in energy planning tools**. Through practical training, participants will develop joint planning scenarios to inform regional energy strategies. The programme will run for 12 months, comprising six five-day workshops for 50 participants from EAPP member utilities. The MESSAGE-SPLAT tool, developed by IAEA and IRENA, will be used to optimize generation and transmission capacity expansion.

The **SPLAT-MESSAGE framework** includes the MESSAGE software and SPLAT-Africa model, defining national power systems and cross-border transmission links. It also features a SPLAT database, Excel

¹ [Advancements in continental power system planning for Africa.](#)

utilities for energy system configuration, renewable resources databases, and an online repository hosted on GitHub for version control and collaborative modelling.

This programme **directly addresses institutional capacity gaps** by equipping EAPP technical committee members with skills in energy planning and scenario development. It also aims to facilitate the systematic adoption of SPLAT-MESSAGE as a standard tool for advancing clean energy transitions in the region. By strengthening the capabilities of EAPP's technical committee, the programme will support the much-needed update of the EAPP Regional Master Plan, which has remained unchanged for nearly a decade. This updated plan will play a critical role in integrating power systems across EAPP member countries and aligning with AfSEM and the CMP's pan-African vision.

This workshop builds upon the in-person training conducted from 22-26 April 2025 in Kigali, Rwanda which provided a basic introduction to SPLAT-MESSAGE and its underlying MESSAGE Reference Energy System (RES). During that session, participants explored key concepts, observed practical installation demonstrations, and installed all required software components, including the SPLAT interface, solver, and CMP model. Following the Kigali training, participants are to complete a homework exercise to review and update critical model assumptions.

This follow-up workshop aims **to deepen participants' hands-on experience with the SPLAT-MESSAGE** model and confirm the reference national scenarios for EAPP member utilities. Through guided sessions, participants will apply their revised assumptions to run single-country models, analyze results, and interpret outputs for use in national energy planning. These exercises will help solidify understanding of the modelling process and directly inform policy-relevant insights. The workshop will also lay the groundwork for upcoming data validation exercises, where participants will compare national CMP results, share technical perspectives, and refine key findings to ensure alignment with regional energy priorities.

Participants will:

- **Review and Update Base Models:** Use SPLAT-MESSAGE national models as a starter kit to understand and revise foundational frameworks for detailed power sector analysis.
- **Explore Technology Modelling:** Learn to model the full range of power sector technologies, including fossil fuels, hydropower, geothermal, biomass, and hydrogen, and apply IRENA's Model Supply Regions (MSR) approach for solar PV and onshore wind, prioritizing sites by resource quality and infrastructure.
- **Apply and Interpret Results:** Run a single-country SPLAT-MESSAGE model using updated assumptions, then review and interpret outputs to inform national energy planning.

By the end of the workshop, participants will have updated national models and strengthen their hands-on experience on modelling techniques and a clear understanding of how to integrate different technologies into national strategies using evidence-based approaches.

Day 1: Overview of the programme and progress

Monday, 23 June 2025

Time (CET)	Session	Speaker / participants
8:30 – 9:00	Coffee	
9:00 – 9:30	Opening remarks	Remarks: TBD (Uganda (Ministry of Energy)), EAPP, AUDA-NEPAD, Get. Transform, IAEA, IRENA)
9:30 – 9:45	Self-introduction of the participants	Intervention: All
9:45 – 10:15	Overview of the programme and preview of the agenda <ul style="list-style-type: none"> Objectives of this training Recap of previous training 	Presentation: Nolwazi Khumalo, IRENA
10:15 – 10:45	Country presentations & discussion of progress last training <ul style="list-style-type: none"> Updates to the SPLAT national model What do the latest results look like Progress on report drafting Q & A	Moderator: Patrice Manirakiza, EAPP Intervention: National working teams
10:45 – 11:00	Coffee break	
11:00 – 13:00	Country presentations <ul style="list-style-type: none"> Updates to the SPLAT national model What do the latest results look like Progress on report drafting Q & A 	Moderator: Patrice Manirakiza, EAPP Intervention: All
13:00 – 14:00	Lunch break	
14:00 – 14:45	Feedback on country homework since Training #2 <ul style="list-style-type: none"> Summary of updates done on SPLAT-E model since last workshop Discussion session – Areas for improvement Discuss issues to be resolved based on the pre-training assignment 	Presentation: Bilal Hussain, IRENA Intervention: All
14:45 – 15:15	Group working session - Setting up cloud national model repositories <ul style="list-style-type: none"> Getting started with source tree and cloud git repositories (using GitHub.com) Revision of pre-training exercises, push and pull simple model edits on cloud) 	Moderator: Bilal Hussain, IRENA Co-trainers: IAEA, AUDA-NEPAD, EAPP
15:15- 15:30	Coffee break	

15:30 – 17:15	Group working session continues	
17:15 – 17:30	Conclusion and program for the following day	Remarks: Nolwazi Khumalo, IRENA

Day 2: Building national base model

Tuesday 24 June 2025

Time (CET)	Session	Speaker / participants
8:30 – 9:00	Coffee	
9:00 – 9:15	Recap of previous day	Remarks: Nolwazi Khumalo, IRENA
9:15 – 10:00	Modelling of hydropower and generation profiles <ul style="list-style-type: none"> Detailed overview of hydro representation Theoretical framework of modelling assumptions 	Presentation: Dr Sebastian Sterl, European Commission (DG ENER), online
10:00 – 10:30	Working session: hydropower - improving model data assumptions in SPLAT models <ul style="list-style-type: none"> Demonstration and representation into SPLAT 	Presentation and demonstration: Bruno Merven, IRENA consultant
10:30 – 10:45	Coffee break	
10:45 – 11:30	Modelling of dispatchable fuels: Fossil fuels, Nuclear, Biomass, and Geothermal <ul style="list-style-type: none"> Theoretical framework of modelling assumptions Demonstration and representation into SPLAT-Africa 	Presentation and demonstration: IAEA, Tonderayi Gumunyu
11:30 – 13:00	Working session: dispatchable fuels improving model data <ul style="list-style-type: none"> Review of input data in SPLAT-Africa Identify any changes that need to be made Implement any changes required for general model/data improvements 	Moderators: IAEA, Tonderayi Gumunyu, Bilal Hussain & Bruno Merven, IRENA Co-trainers: IAEA, AUDA-NEPAD, EAPP
13:00 – 14:00	Lunch break	
14:00 – 15:30	Group working session continues improving model and/or data inputs	Moderators: IAEA, Tonderayi Gumunyu, Bilal Hussain, Bilal Hussain & Bruno Merven, IRENA
15:30 – 15:45	Coffee break	
15:45 – 17:15	Group working session continues improving model and/or data inputs	Moderators: IAEA, Tonderayi Gumunyu,

		Bilal Hussain & Bruno Merven, IRENA
17:15 – 17:30	Conclusion and program for the following day	Remarks: Nolwazi Khumalo, IRENA

Day 3: Defining solar and wind resource potential

Wednesday 25 June 2025

Time (CET)	Session	Speaker / participants
8:30 – 9:00	Coffee	
9:00 – 9:15	Recap of previous day	Remarks: Nolwazi Khumalo, IRENA
9:15 – 10:30	Introduction to solar & wind Model Supply Regions (MSR) <ul style="list-style-type: none"> Theoretical framework of resource identification and screening Integration of MSRs in SPLAT models (resource clusters & their representative generation profiles) 	Presentation: Bilal Hussain, IRENA
10:30 – 10:45	Coffee break	
10:45 – 13:00	Working session: <ul style="list-style-type: none"> Review of wind and solar input data Identify any changes that need to be made Implement any changes required for general model/data improvements 	Moderators: Bilal Hussain & Bruno Merven, IRENA Co-trainers: IAEA, AUDA-NEPAD, EAPP
13:00 – 14:00	Lunch break	
14:00 – 15:30	Group working session continues: improving model and/or data inputs	Moderators: Bilal Hussain & Bruno Merven, IRENA
15:30 – 15:45	Coffee break	
15:45 – 17:15	Modelling of battery storage in SPLAT <ul style="list-style-type: none"> Theoretical framework of modelling assumptions Demonstration and representation into SPLAT Working session: <ul style="list-style-type: none"> Review of battery storage input data Identify any changes that need to be made Implement any changes required for general model/data improvements 	Presentation: Bruno Merven, IRENA
17:15 – 17:30	Conclusion and program for the following day	Remarks: Nolwazi Khumalo, IRENA

Day 4: Economic aspects and emissions in results

Thursday 26 June 2025

Time (CET)	Session	Speaker / participants
8:30 – 9:00	Coffee	
9:00 – 9:15	Recap of previous day	Remarks: Nolwazi Khumalo, IRENA
9:15 – 10:30	Analysing economic aspects of the SPLAT model Cost minimization in SPLAT model <ul style="list-style-type: none"> Types of costs in SPLAT model and RE cost assumptions Analysing costs in SPLAT results 	Presentation: Nolwazi Khumalo, IRENA
10:30- 10:45	Coffee break	
10:45 – 12:00	Analysing emissions aspects of the SPLAT model Emissions data in SPLAT model <ul style="list-style-type: none"> Analysing emissions in SPLAT results interface 	Presentation: Nolwazi Khumalo, IRENA
12:00 – 13:00	Working session – Review and improving results and/or report drafting	Moderator: Bilal Hussain, IRENA Co-trainers: IAEA, Tonderayi Gumunyu, Bilal Hussain, AUDA-NEPAD, EAPP
13:00 – 14:00	Lunch	
14:00 – 14:45	Re-introduction of report outline and contents <ul style="list-style-type: none"> Discuss and agree on the approach to be taken for the teams to draft the report 	Moderator: Dr Atsede, EAPP Intervention: All
14:45 – 15:15	Discussion on pre-training Assignment	Moderator: Nolwazi Khumalo, IRENA
15:15 – 15:30	Coffee break	
15:45 – 16:30	Discussion on pre-training Assignment	Moderator: Nolwazi Khumalo, IRENA
16:30 – 17:15	Case study: Modelling green hydrogen in SPLAT <ul style="list-style-type: none"> Modelling methodology Modelling outcomes 	Presentation: Bilal Hussain, IRENA
17:15 – 17:30	Conclusion and program for the following day	Remarks: EAPP, IRENA

DAY 5: Model improvements

Friday 27 June 2025

Time (CET)	Session	Speaker / participants
8:30 – 9:00	Coffee	
9:00 – 9:15	Recap of previous day	Remarks: Nolwazi Khumalo, IRENA
9:15 – 10:30	Working session continues – Improving your model, and preparing country report	Moderator: Bilal Hussain, IRENA, Dr Atsede, EAPP, IAEA, Tonderayi Gumunyu
10:30- 10:45	Coffee break	
10:45 – 13:30	Working session continues– Improving your model, and preparing country report	Moderator: Bilal Hussain, IRENA, Dr Atsede, EAPP, IAEA, Tonderayi Gumunyu
13:30 – 14:30	Lunch	
14:30 – 15:00	Presentation/Discussion session – ▪ Progress made in Training #3 and next steps in the programme	Presentation: Nolwazi Khumalo, IRENA Intervention: All
15:00 – 15:15	Feedback session	All
15:15 – 15:30	Closing remarks	Remarks: Ministry, GIZ; IRENA; Participants
15:30 – 15:45	Coffee break	
15:45 – 17:00	Group work (Cont'd, Optional)	Group work: All