IRENA
International Renewable Energy Agency

Energy planning support

Summary report

2021 Regional Model Analysis & Planning Support Programme

Central Africa

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1 Introduction

Since 2013, Central African member states of the International Renewable Energy Agency (IRENA) have engaged with the agency on the topic of improving regional energy planning practices.

From 2018-2021, upon the request from the Commission of the Economic Community of Central African States (ECCAS), IRENA and the United Nations Industrial Development Organization (UNIDO) supported ECCAS Member States in the enhancement of regional capacities to establish a vibrant common market for renewable energy and energy efficiency product and services, and in drawing up a Regional Renewable Roadmap to define the actions to be carried out to promote renewable energy, which was validated at technical and ministerial levels. That roadmap includes recommendations to strengthen capacity for long-term energy planning processes and to prepare national and regional power sector or energy master plans that account for an increased share of variable renewables.

Over the course of 2020-2021, to follow through on those recommendations, in partnership with the Central Africa Power Pool (CAPP), IRENA implemented a Regional Africa Modelling Analysis & Planning Support Programme for CAPP member countries. **This summary report provides an overview of the programmes activities and outcomes.**

The six-month Programme was developed in partnership with CAPP and approved by the CAPP planning sub-committee in February 2020, with the aim to strengthen the institutional capacity within its member countries' planning institutions to develop generation capacity expansion scenarios to inform the energy planning process. The programme was designed to end with the submission of a final report prepared and submitted by each country team. **The specific objectives of the programme were:**

- To **provide access to a least-cost optimization modelling tool** and planning methodologies, with introductory software training;
- To **provide multiple week-long trainings on IRENA's System Planning Test (SPLAT)-MESSAGE modelling framework**[1], and scenario modelling;
- **To facilitate better assessment of renewable energy** in the long-term energy mix;
- **To develop long-term scenarios and country analysis reports** beyond the SPLAT trainings, which give a quantitative basis for draft energy or power sector master plans;

[1] A brief overview of the modelling framework can be found in Appendix I.

- To provide the space and time for participants to **review and assess their country's institutional energy planning framework and capacity**, and **learn from the practices of other countries in the region.**

In June 2020, before the training portion of the programme began, a survey on energy planning practices was sent to CAPP countries in order to gauge the current planning landscape of the region. **The consolidated responses to this survey can be found in Appendix II of this report.**

Over the course of 2021, about 50 technical planning experts participated in the training programme, from the most relevant energy planning offices of ministries, electric utilities, and/or specialized government planning agencies. A nomination process was performed by management of the energy planning offices in each country, along with a review of nominees' background by IRENA staff, to ensure that appropriate participants were taking part. Seven CAPP member countries sent representatives, including Angola, Burundi, Cameroon, Central African Republic, Democratic Republic of Congo, Gabon, and Rwanda. **The full list of participants can be found in Appendix III of this report, and an overview of institutions represented can be seen below.**

- **Angola:** Ministério da Energia e Águas; RNT (Rede Nacional de Transporte de Electricidade); IRSEA (Instituto Regulador dos Serviços de Electricidade e de Água)
- **Burundi:** REGIDESO
- **Cameroon:** ENEO
- **Central African Republic:** Ministry of Energy; ENERCA
- **Democratic Republic of Congo:** Ministre d'État des Ressources Hydrauliques et Électricité; SNEL
- **Gabon:** Ministry of Water and Energy
- **Rwanda:** REG (Rwanda Energy Group); EUCL

The programme was fully funded by the generous contributions of the Walloon government, to support capacity building in Francophone countries in Central and West Africa.

2 Training activity

The structure of programme activities is included below, and consisted of roughly 23.5 person-days of participation (over 180 hours) over the six-month training period. It is important to note that engagement and support was not limited to these discrete activities – national teams continued improving their model and national summary report between and after these activities, and IRENA has continued to offer technical support as needed. **Access to the full agenda and set of lecture materials provided in the trainings can be found in the links below.**

1. **Preparatory course on the capacity expansion software MESSAGE**, implemented with the support of the Planning and Economic Studies Section of the International Atomic Energy Agency (IAEA)
    - 1 – 19 March 2021: 3 full days (8 hours each) over 3 weeks
2. **Pre-training Assignment #1: Preparation of Reference Energy System and review of starter model inputs and results**
    - 22 March – 2 April 2021: 4 half days (4 hours each) over 4 weeks
3. **Training Course #1: Country presentations on current planning practice, how to define modelling scenarios, and how to perform basic model updates**
    - 19 – 22 April 2021: 4 full days (8 hours each) in one week
4. **Pre-training Assignment #2: Updating the reference scenario, defining an alternative scenario, and starting to draft country summary reports**
    - 26 April – 11 June 2021: 7 half days (4 hours each) over 7 weeks
5. **Training Course #2: Economic and emissions aspects of modelling and how to model renewable targets for alternative scenarios**
    - 14 – 18 June 2021: 5 full days (8 hours each) in one week
6. **Report drafting: Participants develop country reports synthesizing their modelling and analysis**
    - 21 June – 25 September 2021: 10 half days (4 hours each) over 10 weeks
7. **Final presentation session: presentations to high-level representatives from regional and international organisations involved in energy planning in the region**
    - 29 September 2021: 1 full day (8 hours)

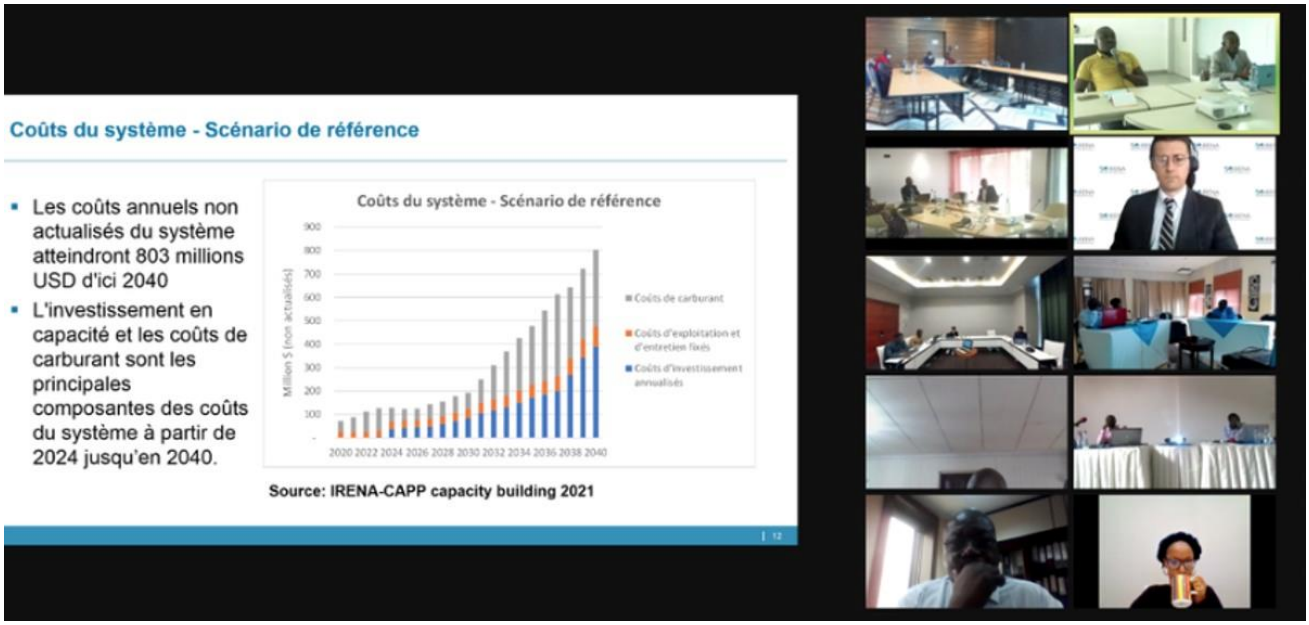

Figure 1: Presentation by Gabon during Training Course #2

Figure 2: Final presentation session of the programme.

2. 1 Logistics

Given the unique circumstances under which the programme took place due to the global pandemic, the training activities were conducted through a hybrid approach, with the following logistics:

- Hotel conference rooms booked for each national team (7 countries)
- ENG / FRE / POR language simultaneous translation
- Primary connection through hotel AV system
- Exercises performed by country teams in Zoom breakout rooms with virtual expert support
- Presentations / discussions held centrally
- All materials / attendance / recordings tracked through Sharepoint

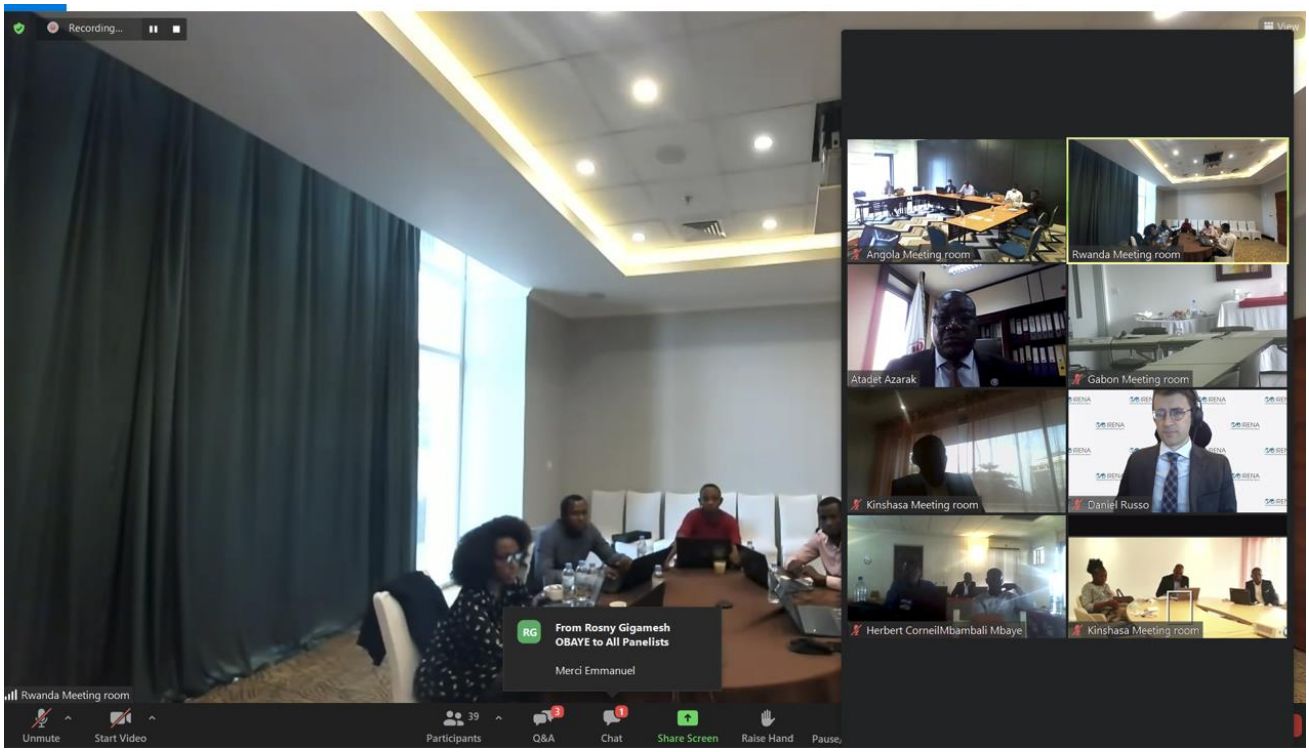

Figure 3: Views of the typical training activity setup

3 Final presentation session

In this final presentation session, IRENA, the CAPP Secretariat, and country participants presented the work that has been done by country teams to develop long-term scenarios with IRENA's System Planning Test (SPLAT) model framework for Central Africa, which allows national energy planners to assess the future energy mix from economic, technical and environmental perspectives.

The session invited high-level representatives from regional and international organisations involved in energy planning in the region, including: the African Development Bank, the Africa-EU Energy Partnership, the African Union Development Agency, the International Atomic Energy Agency, the United Nations Economic Commission for Africa (UNECA), the United Nations Department for Economic and Social Affairs (UN-DESA), the United Nations Industrial Development Organisation (UNIDO), and the World Bank.

Each country team presented the results and key takeaways of their power sector modelling and analysis to the organisations in attendance, showing that there is now a solid foundation for future work by any stakeholders on the topic of energy planning and renewables in the Central African region. Feedback and commentary from representatives during the roundtable discussion highlighted opportunities for further regional collaboration on energy planning going forward, which can inform future IRENA capacity building programmes, including work with the Central African Power Pool to support their first regional masterplan.

Figure 4: Roundtable discussion in the final presentation session

3. 1 Stakeholder feedback

A summary of the main contributions and feedback provided by external partners during the country presentations and roundtable discussion in the final programme session is outlined below :

- **Africa EU Energy Partnership (AEEP): Johan van den Berg**
  - Very supportive of the effort to promote regional planning as a critical complement to national-level planning for the renewable energy transition, given the technical efficiency of renewable energy paired with interconnections
  - Also sees this work as important in a wider political context, given the major summits occurring in 2021 related to climate and the Africa-EU partnership

- **International Atomic Energy Agency (IAEA): Mario Tot**
  - Would like to congratulate IRENA on their effort to bring capacity building to a new level by introducing pre-populated models, thus speeding up the process
  - Planning extensive capacity building in Africa for next 4 years starting in 2022, and will certainly continue cooperating with IRENA on these activities
  - Glad to see that national teams are presenting and exist, with quality to produce the documents needed

- **African Union Development Agency (NEPAD) Simbini Tichakunda**
  - Highlights the fact that the member states have been presenting and owning the models that have come out of this process – thinks this is something that they can learn from as they develop the continental masterplan (CMP)
  - Would like to recognize the important linkages between what has been done in the programme and what is being planned for the continental masterplan – one of the prerequisites of the CMP is that there should be support to the CAPP to develop their regional masterplan, which will then feed into the continental plan
  - Need to capitalize on the momentum of what this programme has collectively achieved and would want to recommend that an important next step is to see how to bring together all of the national models and combine them into a regional model, which would then form the basis of the development of the regional masterplan
  - Also welcomes the fact that the SPLAT model has been used, which has also been selected as the modelling tool for the CMP, and would recommend to use the same model for the regional masterplan to build on the progress that has been made
  - Would also recommend that the experts of this training continue to be those involved in the regional and continental plans given the capacity that has been built – would encourage this group of people who have been trained are included in future masterplan development
  - Want to learn from this experience to also possible replicate this for other regions and improve and refine the work under the CMP
  - Currently working together with the World Bank, AfDB and AUDA-NEPAD to develop a comprehensive support programme to strengthen the CAPP, and in future they can look to expand that group to include IRENA and other partners

- **African Development Bank: Franklin Gbedey**
  - This training is very important, because what we've seen is that the capacity regarding planning in African countries is very low, which is having an impact on costs due to persistent deficits in supply
  - Would like to encourage IRENA and all stakeholders to continue this work
  - Given the potential in Central Africa, it is important that there is cooperation in the power pool to develop strategically important projects

- **African Development Bank: Ibrahima Konate**
  - Teams have raised concrete difficulties which need to be resolved, for example the lack of existence of data
  - The institutional issues faced could also be resolved by having more permanent teams who work on these types of exercises - suggests that CAPP could help to progress on that path
  - Supports the investigation of power exchange between countries to solve many of the problems, and for teams to be trained on this aspect specifically
  - Also notes that multiple types of models can cause difficulties if not well coordinated – countries can be supported to determine which model suits them best
  - Natural gas use in the model should be well-documented and justified, since there is a strong debate about its future

- **UNECA: Linus Mofor**
  - Suggests maintaining a link to the NDC objectives when possible when modelling scenarios
  - Tools like the ones used in this training in conjunction with those that look at CLEWs provided by the UN allow an opportunity to see how best to meet country's NDC ambitions and explore future net-zero pathways
  - Supports the exploration of power trade opportunities among the region in future work
  - Also recommends that scenarios could focus on the need for industrialization

- **UN-DESA: Thomas Alfstad**
  - Promotes using CLEWS tools as complementary to those used in this programme to assess energy development in the overall framework of policy coherence
  - Raises the issue of difficulty coordinating between ministries, leading to practice of working in silos and not necessarily involving all relevant stakeholders – stresses importance of inter-agency or inter-institutional teams that can collaborate
  - Agrees with some of the country conclusions that to effectively use analytical tools, they need to be properly integrated into the work of the institutions and planning mechanisms
  - Notes synergies between this prorgamme and their work regarding data collection, building technical capacity, and would be happy to strengthen the links between electricity and energy planning and what happens in other parts of the planning world

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- **UNIDO: Martin Lugmayr**
    - Highlights importance of planning at national level, and even greater importance at regional level, where there is an opportunity to accelerate the energy transition by interconnecting countries so they can tap into the best available renewable energy resources
    - Suggests considering energy security issues and network losses in scenarios given how serious they may be in certain countries
    - Mentions the impact that climate change may have on hydropower, and that climate resilience could also be explored in scenarios
    - Stresses the need for action-oriented energy planning, to keep in mind the implementation phase and the project pipelines, and to situate power sector planning within the overall energy sector and issues of access and decentralized energy
    - Notes the establishment of a new regional renewable energy and energy efficiency center in central Africa with support from IRENA, which will be a future source of capacity at the regional level and an opportunity to collaborate on energy data collection

- **World Bank: Elvira Morella**
    - Notes the Bank's work in promoting regional integration, for example the first interconnector between Cameroon and Chad
    - Share all the comments and remarks regarding the importance of taking NDCs as a good starting point and seeing how much more ambitious targets could be
    - Notes that one of the requirements to access funds is the establishment of official national masterplans, but also plans that are coordinated at a regional level
    - Supports the importance of including the access dimension, for example in national electrification strategies
    - Mentions the importance of competitive procurement to deliver on priorities identified by masterplans

4 Key recommendations, lessons learned, and next steps

In the final meeting of the programme, all country teams provided their feedback on key issues, recommendations, and lessons related to their experience throughout the training and the development of long-term scenarios. The teams noted a range of concrete issues that emerged during their experience and made some recommendations about how those could be addressed going forward :

- **Angola:**
  - Experience provided them with better tools for their simulations, and they will go on to develop the model to better advise the government; it particularly re-inforced their policy view that diesel will be phased out soon and more renewables will be built;
  - However they realized that data was an issue, using this opportunity to raise issue of a database for their institutions;
  - As a result of the training they will issue a report to the Ministry about their work, the value of the programme, and the challenges they faced (to be addressed by their management, e.g. the need for better data)

- **Burundi:**
  - Highlighted data as their main problem;
  - They would like CAPP to have more meetings, so they can also meet with other countries to learn from them

- **Cameroon:**
  - Highlighted the need for maintaining data and all of the work done with regular updates;
  - Asked CAPP to clarify the process that will be in place for member states to keep data and tools updated;
  - This programme has supported their view that their national masterplan needs more regular updates, with teams in the ministry in charge of that process, and hopes the bilateral support from IRENA can facilitate this.

- **RCA:**
  - Would like to continue the work in this programme with IRENA if possible to further develop their model;
  - They see this as an indispensable tool to base their planning in reality and better understand the possible future developments of their energy mix.

- **DRC:**
  - Raised issue of persistent gap between planning and implementation;
  - Institutional engagement with decisionmakers is still needed, since they need political recognition of the importance of such tools and analyses to complement the technical side that has been developed in this programme;
  - Would like to explore most sensible interconnectors for DRC;
  - Additionally noted the lack of centralized data at the ministry level, difficulties obtaining data from private plant operators, and difficulty devoting sufficient time due to competing urgent tasks of staff.

- **Gabon:**
  - Worried that after the programme, the use does not continue; they are happy they now have the tools, but it's unclear what will be used officially, so need better follow up and for ministers to buy-in/standardize these sorts of planning processes, otherwise they always need to restart from scratch;
  - Also highlighted challenges in collecting data (particularly regarding demand) and the need to keep database updated.

- **Rwanda:**
  - Agree with all previous points and they look forward to next phase about power exchange;
  - Also highlight the importance of data update process.

- **All of the participants called to institutionalise/stabilize/expand the planning and modelling processes performed in the programme – this shows the strong value and demand for this work**

Building on the activities and feedback outlined in this report, IRENA is now well-positioned to proceed to a second phase of support with the endorsement of the CAPP secretariat and its members. The next steps of this engagement are planned to begin in 2022, with the objective of furthering the training of CAPP member utilities on long-term power sector modelling and developing a consolidated technical study which could be used as the basis for the eventual development of the first regional power sector masterplan. Building on the recommendations from external partners, the trainings in future workshops will focus on conducting more in-depth analysis of various SPLAT-MESSAGE model inputs and results. For example, as recommended, trainees will be presented with a chance to develop and analyse a wider variety of scenarios related to regional policy targets, and will also investigate regional dynamics such as opportunities for cross-border trade in more detail. IRENA and CAPP will also look forward to keeping other development partners and high-level stakeholders involved in the second phase of this support that is to come.

4. 1 Final report status

The status of country teams' final summary reports is included below. At the time of writing this report, 5 of the 7 country teams have submitted their final summary reports and have been issued certificates of programme completion. All final reports have been compiled in a separate document and are available upon request (energyplanningcb@irena.org).

- **Angola:** Completed 17 November 2021
- **Burundi:** Completed 21 February 2022
- **Cameroon:** Completed 11 January 2022
- **RCA:** Draft finalisation in progress
- **DRC:** Awaiting draft submission
- **Gabon:** Completed 23 November 2021
- **Rwanda:** Completed 19 November 2021

5 Appendices

5. 1 Appendix I: SPLAT-MESSAGE model

The SPLAT country models used in this programme were developed using a modelling software platform called the Model for the Study of Energy Supply Strategies and their Overall Environmental Impact (MESSAGE), a dynamic, bottom-up, multi-year energy system model applying linear and mixed integer optimisation techniques. This modelling platform was originally developed by the International Institute for Applied Systems Analysis (IIASA), but has recently been refined by the International Atomic Energy Agency (IAEA).

The modelling platform is a flexible framework within which the actual model is developed. The MESSAGE modelling platform consists of a set of demand projections, a database of transport infrastructure, energy supply technologies characterised by economic and technical parameters, and information on the existing capital stock and its remaining life.

Starting from the existing electricity infrastructure in the region, the model calculates an evolution of different technically feasible technology options that achieve a least cost objective over the planning period (i.e. total discounted minimum system costs, including capital, operation and maintenance (O&M), fuel and other user-defined costs), while meeting a number of system requirements (e.g. supply matching demand at a specific time, sufficient resources and capacity to provide the desired level of generation) and user-defined constraints (e.g. reserve margin, speed of technology deployment, emission limits, policy objectives).

The inputs to the model can be varied according to user preference, in order to explore different scenarios of system evolution under specific sets of assumptions. The model's 'solution' includes, among other things, investments in new technologies, production, fuel use and trade. The economic and environmental consequences associated with the least-cost energy systems identified can be easily calculated using the model.

More detail on the SPLAT-MESSAGE modelling framework and how it has been applied by IRENA can be found at this link.

5. 2 Appendix II: Energy planning survey responses

5. 2. 1 Status of energy planning activities

1a	Are energy statistics available and updated regularly? Which institution is responsible for that?	
	Country	**Answer**
1	**Angola**	Statistical information is **available, but limited and from sources dispersed** in the institutions of the different sectors of the State (Electric, Oil and Mines).
2	**Burundi**	**Energy statistics are available because each year the Ministry in charge of energy prepares a statistical yearbook** to be transmitted to ISTEBU, the national institution in charge of statistics, for publication. It should be noted that each institution has services related to statistics.
3	**Cameroon**	There is a document called energy balance of Cameroun which gives information on the energy situation in Cameroon. It is **elaborated by the Ministry of Energy and Water (MINEE)/ Department of Renewable Energy and Energy Management (DERME)/Unit of the National Energy Information System (CSNIE). It is supposed to be elaborated each year**. This document is not published but is vulgarized through various administrations. It was last updated in 2016.
4	**CAR**	**The Energy Information System of the Central African Republic (SIE-RCA) team, composed of five (5) executives from the General Directorate of Energy Development, has published a total of four annual reports: 2013, 2014, 2016 and recently 2020.** Note that the Ministry in charge of energy does not yet have a website for the publication of these annual reports. At the beginning, the publication is done through a validation workshop where all stakeholders are invited. Due to a lack of funding since 2015, the team has been publishing the latest annual reports by sending them to the actors' e-mail boxes.
5	**Chad**	Energy statistics are **up to date, though they are not being updated regularly**. Last date of publication is August 17th, 2018. The **responsible institution is the Ministry** responsible for Energy. However the document was developed by the European Union through the project Global Climate Change Alliance (GCCA-Tchad)
6	**Congo**	NA
7	**DRC**	Yes **available, published internally in the company's monthly reports** (SNEL SA) and the latest update is the 2018 annual report. Responsible institution at the company level is the General Control Department (DCG in acronym)
8	**Equatorial Guinea**	NA
9	**Gabon**	There is no dedicated structure for the production of statistical data. **Responsibility for producing this data rests with the Directorate General of Energy** (DGE). On the other hand, there are publications of the **annual activity reports of the actors of the sector such as the Société d'Energie et d'Eau du Gabon (SEEG)**, the Regulatory Agency of the Drinking Water Sector and the Electric Energy (ARSEE).
10	**Rwanda**	Yes, the **National Institute of Statistics of Rwanda, NISR publishes a statistical yearbook which has a section on energy every after 2 years**, RURA also publishes energy production, consumption, and other data like tariffs. Major energy statistics and documents are published on the Rwanda Energy Group and Ministry of Infrastructure Website.
11	**Sao Tome & Principe**	The public concessionaire company **(EMAE) presents an annual report** on balance sheets and accounts, **where all statistical data relating to the country's electricity sector can be found**. The **process of creating the official website of the Energy sector with the Directorate of Energy is underway**, where we can find all the information on the sector. Likewise, at the level of the Energy Department, the creation of an Internet site where data from the energy sector will be published and updated is also underway

1b	**Is there a comprehensive energy/power sector master plan, according to which current energy policies are guided? If so, when was it developed, and who executed the preparation of the study? What is the time horizon for the plan?**	
	Country	**Answer**
1	**Angola**	Yes: The strategy book "Visão Angola Energia **2015 - 2025" prepared by the Ministry of Energy** using External Consultancy, **which are the guidelines for the Electricity Sector**; The "Master Plan for the Electric Sector **2018 - 2040", Elaborated (2017/2018) by the Ministry of Energy**, using external consultancy and support from Angolan Electric Sector utilities, mainly RNT; The "Strategic Plan for the **Transmission Network (PERT) 2020-2030" prepared by RNT**, having as guidelines the 2018-2040 Master Plan
2	**Burundi**	**There is a master plan for generation and transmission which runs from 2017 to 2040 for transmission and 2017 to 2030 for generation. It was developed in 2017 but the final report was submitted on 30 March 2018** by a TRACTEBEL office.
3	**Cameroon**	There exists a **Power Sector Master Plan (PDSE)** which ran **from 2013 to 2019**. This goes in line with another document called **Renewable Energy Master Plan (PDER)** which runs **from 2016 to 2035**. **A new PDSE is being elaborated** which is based on the growth and jobs strategy paper (DSCE). It was developed and prepared by the Ministry of Water Resources and Energy (MINEE) and is intended to run till 2035
4	**CAR**	**No. It is being developed with funding from the World Bank** as part of the Water and Electricity Sector Improvement Project (PASEEL).
5	**Chad**	Yes, there is a sector **master plan for energy in general (adopted January 30th, 2012) and a master plan for renewable energies (adopted August 17th, 2018).**
6	**Congo**	NA
7	**DRC**	Yes, the last date of 2005 by 2015 (by SNEL SA), its **update is under development for 2035**. The study plan is provided by the Studies, Planning, Norms and Standards Department (DEP in acronym). Duration of the plan is 15 years. SNEL SA, with its current vocation as a commercial enterprise, prioritizes centers where its field of activity shines and is interested in the electrification of reliable centers. Normally this task falls to the Ministry in charge of energy.
8	**Equatorial Guinea**	NA
9	**Gabon**	Yes, there is an electrical energy master plan first produced in 1999 by TECSULT (Canadian Design Office). It was updated in 2010 and **2015 by AECOM (former TECSULT) for a period of 30 years** under the supervision and validation of the DGE. **In addition, a master plan for the production, transport and distribution of electrical energy up to 2040 has been drawn up by the consultancy firm Innovation Energie Développement (IED)**, as well as a master plan for electrification and access to water in rural areas piloted by the Cabinet MSA. These studies are available since March 2020.
10	**Rwanda**	**Yes, we have both short and long term plans i.e. Energy Sector Strategic Plan 2017/18 to 2023/2024 and the company's annual development plans in Generation (LCDP), Transmission, Distribution and Access plan**. The **least cost power development plan (LCPDP)** was developed using MESSAGE and was approved in June 2018. This was **executed by REG and the time horizon is up to 2040** (currently from 2020 – 2040).
11	**Sao Tome & Principe**	We **don't have a master plan**. We have a **Low Cost Development Plan for the electricity sector completed in 2018**, which establishes the guidelines that we must follow in order to develop the electricity sector in STP. The referred plan was carried out for the period **from 2018 to 2035**

1c	How often is the energy master plan updated? Is there local resource (financial and human) available to update it regularly?	
	Country	**Answer**
1	**Angola**	**The "Master Plan for the Electric Sector 2018 - 2040" aims to update it every 5 years**. The first update is scheduled for 2023, but due to the dynamics of the Electric Sector there is a need to anticipate for 2021. There are **limited financial and human resources** for the Planning Teams of the different entities of the Electric Sector, coordinated by RNT. It is necessary to expand these capacities
2	**Burundi**	**The energy master plan is updated every 3 to 5 years depending on the financial means available.** It should be noted that the World Bank has granted a budget for the updating of this master plan. Local human resources are available to update it regularly.
3	**Cameroon**	It is **regularly evaluated**. **Local financial resource is available** through funds made available by the world bank in the form of loans. As for the local human resource,…..
4	**CAR**	**As this tool is still under development, the frequency of updating would be discussed at the validation workshop of this document.** Nevertheless, it is obvious to consider a possible alternative in terms of resources available or not available for its update. Normally, an operational mechanism for advocacy and mobilization of resources from the government and its usual partners, including IRENA, should accompany its implementation strategies for effective and sustainable energy planning. In principle, human resources exist locally, but a sharing of experience would always be useful in this kind of crucial exercise for the country, the region and the Central African sub-region.
5	**Chad**	The **master plan is updated every 3 to 5 years**, depending on the availability of financial means of the Ministry responsible for Energy. **Availability of financial resources is not certain**.
6	**Congo**	NA
7	**DRC**	**Update frequency is 15 years**. **Human resources are available but it is difficult to obtain the financial means** to carry out this task.
8	**Equatorial Guinea**	NA
9	**Gabon**	The **update frequency is five years**. On the other hand, **there are no financial resources for their regular updating**.
10	**Rwanda**	**The short term plan is updated twice every year while the ESSP is updated every after Five years.**
11	**Sao Tome & Principe**	It is understood that the **update frequency is every 10 years**. **We have the human resources to update the plans**, although we need continuous training, **but we do not have the financial means to do so**

1d	Which institutions, ministries or departments are responsible for the planning? Which stakeholders are consulted? What is the role of the utilities for the power sector expansion plan?	
	Country	**Answer**
1	**Angola**	**RNT is responsible for coordinating and executing the planning of the Generation and Transmission Network, under the guidance of the supervisory body (Ministry of Energy)** and participation of: Regulatory Institution of the Electricity and Water Sector (IRSEA), which provides the Legal, Institutional and Regulatory framework of the Electric Sector; National Electricity Distribution Company (ENDE-E.P.), which provides information about the current network and its development in the short and medium term; Public and Private Generation Companies, which provide information on the current status of the equipment and operating statistics
2	**Burundi**	**The institution responsible for planning is the Directorate General for Energy (DGE). Stakeholders (REGIDESO, ABER and the Ministry in charge of energy via the services in charge of planning) are consulted.** The role of the utilities in the electricity sector expansion plan is to plan, execute, monitor and evaluate the projects included in the National Development Plan (NDP).
3	**Cameroon**	The **Ministry of Water Resources and Energy is responsible for the planning**. The stakeholders involve the public sector like MINEPAT, MINFI, MINEPDED, ARSEL, SONATREL. For the private sector we have ENEO, Groupement Interpatronaux, Civil Societies (NGOs and associations). The role of the utilities include execution, follow up, promotion and regulation
4	**CAR**	**The Ministry of Energy and Water Resources Development**, the institutional body in charge of energy policy through the General Directorate of Energy Development, the technical operational body through the **Directorate of Studies, Statistics and Planning is in charge of energy planning**. The actors include sectoral departments such as the Ministry of Planning, which has a cross-cutting unit, the Central African Institute for Statistical and Economic Studies, DGDE executives, resource persons from the supervising structures and other actors in the field. The role of the public services in the energy sector expansion plan is to lead, supervise, ensure, coordinate and plan the activities of the national energy policy. Note that each Ministry has a Directorate of Studies and Planning
5	**Chad**	The **institution responsible for planning is the Ministry responsible for Energy**. Actors are, among others : the Société Nationale d'Electricité (SNE), the Agence pour le Développement des Energies Renouvelables (ADER), the Institut National de la Statistique, des Etudes Economiques et Démographiques (INSEED). The part played by utilities is the implementation through the developement of projects, their realisation, their tracking, etc.
6	**Congo**	NA
7	**DRC**	**On the SNEL SA side, it is the Studies, Planning, Norms and Standards Department (DEP in acronym). At the government level, there are entities in charge of planning respectively at the Ministry of Energy and Hydraulic Resources and at the Ministry of Planning.** The actors to be consulted at the level of the company are the departments of Production, Transport, Distribution and Commercial of electrical energy, At the country level are the utilities. These are the National Institute of Statistics, Ministries in charge of the Economy, Energy, Territory, Environment, the Central Bank of Congo, etc.
8	**Equatorial Guinea**	NA
9	**Gabon**	Planning is **carried out by the Ministry in charge of Energy in collaboration with other sectors** (Economy, Budget, Environment, Mines, Industry, Transport, Agriculture, Hydrocarbons). The stakeholders consulted are: mining companies, NGOs, SEEG, ARSEE, CNEE, Société du Patrimoine, manufacturers, etc.
10	**Rwanda**	**The utility is responsible for the development and update of all power sector development plans (LCPDP, transmission, Distribution and Access)**. Responsible department(s) for these plans: Strategic Planning Department (REG) in conjunction with Planning Department of its subsidiary i.e. EDCL & EUCL. Other stakeholders include **the Ministry of Infrastructure of Rwanda (MININFRA) and sector working group (SWG) that convene to review and approve these documents.**
11	**Sao Tome & Principe**	**Multiple institutions responsible for planning**: the Concessionaire (EMAE), Regulation (AGER), the Directorate of Industry, the Directorate of Planning, the National Institute of Statistics (INE) and the Directorate of Energy of Ministry

1e	**Is there a particular demand forecasting technique that is employed (Statistical, bottom-up, top-down, hybrid)? If so, which one and which modelling tool is used (own tool, LEAP, MAED, etc.)?**	
	Country	**Answer**
1	**Angola**	For the demand forecast, the statistical methodology is used, a tool devoted to the purpose is not used, as the **main means is Microsoft Excel**
2	**Burundi**	The demand forecast is based on the statistical data available. No other particular tool is used for this purpose.
3	**Cameroon**	The particular demand forecasting technique employed is mostly statistical. **Own tool.**
4	**CAR**	NA
5	**Chad**	No, there is **no particular demand technique/tool**
6	**Congo**	NA
7	**DRC**	No, no requirement. For the modeling: On the demand side, **SNEL SA uses an Excel model, similar to the MAED**. On the planning study side, SNEL SA uses the PowerfactoryDigSilent software
8	**Equatorial Guinea**	NA
9	**Gabon**	There are **no specific requirements** for the conduct of these studies at this time. But, there are modeling tools for the study conducted by IED and for the partnership with the International Atomic Energy Agency (IAEA).
10	**Rwanda**	The current method being used is historical trending and GDP growth trends to produce a flat annual demand growth rate. **A MAED model does exist but it is pending approval** after which it can be incorporated into MESSAGE.
11	**Sao Tome & Principe**	**To date, we have no software**. The energy directorate **considers that the ReadEscreen software program would be suitable** for carrying out sector planning and that a process for acquiring and training technicians is under way

1f	Are there modelling tools used to develop energy master plans?	
	Country	**Answer**
1	**Angola**	**Generation Planning - PDPAT (Power Development Planning Assist) and Excel models**; Transmission Network Planning - PSS®E (Power System Simulator for Engineering).
2	**Burundi**	The software used to develop the master plan is : **SCANNER, PRELE, QGIS and EUROSTAG**
3	**Cameroon**	**Yes** (not specified)
4	**CAR**	**GEOSIM, a software developed by the company Innovation Energie Développement (IED)** in France. It is a decision support tool focusing on rural electrification planning. It is based on a Geographic Information System (GIS) and operates in the Manifold environment. It is part of the Intensive Peri-urban Electrification Project Planning component. The team that has been trained on the use of this tool is all part of the project.
5	**Chad**	The tools used are: **Sphinx, MESSAGE, Arcgis and Excel**
6	**Congo**	NA
7	**DRC**	Yes, only one modeling tool used (**Powerfactory DigSilent**)
8	**Equatorial Guinea**	NA
9	**Gabon**	No response
10	**Rwanda**	YES, **MESSAGE for the LCPDP, Dig SILENT- Power Factory, PSS/E & GIS used in Transmission, Distribution Access plans**.
11	**Sao Tome & Principe**	No

1g	**Is there institutional capacity with any energy modelling tools? If so, which tools, and who were trained?**	
	Country	**Answer**
1	**Angola**	**Generation Planning - PDPAT (Power Development Planning Assist), limited modeling capacity**; Transmission Network Planning - PSS®E (Power System Simulator for Engineering). Acquired from Siemens and it provided training to RNT's Electrical System Planning technicians
2	**Burundi**	There are executives trained **in the use of the Autacad software**. As for the other software, we are seeing how to execute these trainings because they are very important.
3	**Cameroon**	This is **not clearly known** but more information shall be added on this eventually
4	**CAR**	**There are skills within the Ministry. However, with the cash flow difficulties that our country is facing after the military-political crises, it is very important and motivated that capacity building of executives and actors of the sector be carried out** in order to facilitate access to the improvement of the planning system and performance in the use of energy modeling tools and especially with the new planning tool such as the MESSAGE-SPLAT. A team of executives from the Directorate General of Energy Development has been trained on Geosim and operates in the Manifold environment. It should be noted that these managers have been called upon to perform other functions.
5	**Chad**	There is **no capacity to this day, because the master plan have been developed by firms**.
6	**Congo**	NA
7	**DRC**	Yes, **some SNEL SA agents have been trained in the use of Powerfactory DigSilent** software. For other tools, the answer is no.
8	**Equatorial Guinea**	NA
9	**Gabon**	At the moment there are **no modeling tools or trained people**
10	**Rwanda**	YES, **some staff were trained in MESSAGE and MAED**, while others were trained power system planning tools i.e**. PSS/E, ARCGIS and DigSILENT-Power Factory**
11	**Sao Tome & Principe**	No

1h	How is the process of NDC development linked with the energy planning process?	
	Country	**Answer**
1	**Angola**	There is **no direct link**, but in planning there are guidelines and strategies for reducing polluting generation sources (diesel) by cleaner (renewable) sources
2	**Burundi**	NA
3	**Cameroon**	Cameroon's objective is to reduce its carbon emission rate by 32%. the link in this case is to increase the production of energy by the construction of hydroelectric plants. Secondly, the hybridization of thermal power plants. Also, interconnection of existent networks. Fourthly, reduction of use of firewood etc
4	**CAR**	NA
5	**Chad**	No response
6	**Congo**	NA
7	**DRC**	**NDCs are part of the information to be used in the planning process in its demand study stage and in the identification of priority investment programs** in order to take into account, among other things, the orientations on climate change
8	**Equatorial Guinea**	NA
9	**Gabon**	No response
10	**Rwanda**	YES, it is **linked and well streamlined in the Energy Sector Strategic Plan**.
11	**Sao Tome & Principe**	CDN was carried out in 2015 and takes place over a 6-year horizon and **is interconnected with the Low Cost Development Plan** for the electricity sector

5. 2. 2 Country efforts to strengthen capacity

2a	Is there dedicated energy planning team within the government? How big is the team?	
	Country	**Answer**
1	**Angola**	Within the Electric Sector of Angola, including the Ministry of Energy, **the only entity that deals with the planning of the Electric System in a dedicated way, which includes energy planning (Demand forecast and meeting generation requirements), is RNT**
2	**Burundi**	**At the level of the Presidency, there is a strategic study office including a team in charge of energy planning and mining.** It is large and the directors of each department are headed by executives appointed by Presidential Decree.
3	**Cameroon**	Not exactly since **the whole Ministry of Water Resources and Energy is in charge of the planning**
4	**CAR**	A CEMAC National Energy Facility Unit composed of two teams was set up in 2009, consisting of a Planning Team composed of five (5) executives from the Ministry in charge of Energy, the Ministry of Planning, the Agencies of the electricity sector and the electricity company. The members of this team were trained and worked until 2012, the year in which they wrote their final report. It should be noted that as a result of the military-political crisis in 2012, the team lost all project materials including the software key. There is currently **a team from the Department and a team from ENERCA at the Direction des Etudes et de Distribution**.
5	**Chad**	There is **a Planning Direction in the Ministry for Oil, Mines and Energy** (Direction de Planification au Ministère du Pétrole, des Mines et de l'Energie) which is responsible for the planning part
6	**Congo**	NA
7	**DRC**	There are some, but the unit is not equipped for planning because **it uses the planning of SNEL SA**
8	**Equatorial Guinea**	NA
9	**Gabon**	There is **no dedicated team**
10	**Rwanda**	Yes, there is a team. This is **composed of REG Strategic Planning and Energy department from the Ministry of Infrastructure (MINFRA) in conjunction with the planning departments in the 2 Subsidiaries of the national Electricity Company** (REG) i.e. EUCL and EDCL planning. (**About 15 people involved in the process**).
11	**Sao Tome & Principe**	**Multiple institutions**: The Concessionaire (EMAE), the Regulation (AGER), the Directorate of Industry, the Directorate of Planning, the National Institute of Statistics (INE) and the Directorate of Energy of the Ministry.

2b	Are there ongoing efforts to strengthen the country's energy planning capacity? Are there regional/international partners in these efforts?	
	Country	**Answer**
1	**Angola**	Yes, **there are reinforcement and training efforts, but not enough. RNT interacts with regional bodies (SAPP / SADC)**
2	**Burundi**	**The partners for capacity building are China, Egypt and pools such as PEAC and EAPP.**
3	**Cameroon**	The **Ministry of Water Resources and Energy is in charge of capacity building of its personnel through its own budget**. International governments like those of China, India, through trainings organized by these governments and to which our services are invited. World bank like an international partner.
4	**CAR**	**No**, recently with the help of PEAC jointly with the International Energy Agency (IEA), an online training was organized in January 2021 for capacity building of executives on statistical data and energy modeling in Sub-Saharan Africa. The absence of certain tools that can be used for energy planning such as the master plan and many others is now a challenge. The use of these tools could enable the country to adopt monitoring mechanisms, advocacy strategies and capacity building. CAR has come a long way from the recurrent crises it has experienced. In 2017, the government put in place the Central African Recovery and Peacebuilding Plan and the Mutual Commitment Framework (RCPCA-CEM), whose energy component was included in Pillar 3, which focuses on the rehabilitation and construction of energy infrastructure. However, this plan did not take into account capacity building for the managers in the Ministry. The CAR is going through a recurring crisis, so the financial difficulty is a major barrier that needs to be overcome. The measure that could remove this barrier is the support of development partners for capacity building in energy planning.
5	**Chad**	The **Ministry responsible for Energy aims at forming at team of engineers on planning tools such as LEAP, MESSAGE, MAED**, ... to enable good planning, **but nothing is done for now**. Yes, there are international partners, IAEA trained two persons on the basics of MESSAGE but more as individuals
6	**Congo**	NA
7	**DRC**	**No**, but there is a project management unit (financial aspect) attached to the Ministry of Energy and financed by the World Bank "UCM" = Project Coordination and Management Unit
8	**Equatorial Guinea**	NA
9	**Gabon**	Some agents have received summary training on planning tools, as part of the studies underway on the production, transport distribution master plan, the master plan for electrification and access to water in rural areas and, other part of **cooperation with the IAEA**
10	**Rwanda**	Rwanda is also a member of the East African Power Pool, from where we **have joint working groups on Planning**, Operations and Market, for planning purposes, power balance Statement, power system model using PSS/E for all the member countries was developed. Also there is **Ongoing partnership with trainers under the IAEA on MAED and MESSAGE**; support on development of models from the team at IAEA.
11	**Sao Tome & Principe**	The **Directorate of Energy is currently making efforts to train technicians, with support of some institutions such as AFREC, PEAC**

5. 2. 3 Motivation for joining the programme

3a	Describe how this training would be utilized to enhance and improve your country's energy planning activities	
	Country	**Answer**
1	**Angola**	Define strategies for variable renewable energy integration; Develop a more substantive data base; Improve the coordination between the government and utilities; Reduce the short term solutions costs caused by the lack of proper planning; Prepare national power sector master plans that account for an increased share of variable renewables; Improve long-term energy planning practice by providing access to a state-of-the-art least-cost optimization modelling tool and planning methodologies; Develop, update and maintain national power system models; To facilitate better assessment of renewable energy and its role in the long-term energy mix; and To support national energy planners in the use of energy system planning models for energy policy making.
2	**Burundi**	Having noticed the importance of using the MESSAGE software in energy planning, it is necessary for IRENA to get in touch with the management of REGIDESO in order to improve the knowledge of the use of MESSAGE for the managers in charge of planning and to proceed with the implementation within our company.
3	**Cameroon**	NA
4	**CAR**	In this time of ecological transition, all initiatives aimed at saving the means of producing energy are welcome. **This capacity building program fills the gaps already observed in terms of unavailability of some planning tools, improve the level of knowledge** on new applications on the one hand and on the other hand offer opportunities to integrate a community where energy insecurity still remains a major challenge to access modern energy sources and energy efficiency in order to optimize performance in the energy planning system. This training for the CAR is **a crucial option to have efficient executives in energy planning in CAR**. It will enable the managers of the Directorate General of Energy Development to have the skills required to improve the practice of long-term planning by knowing how to master the modeling and optimization tool such as MESSAGE-SPLAT. This will also **facilitate a better assessment of RE and its role in the long-term energy mix**, of which the country has a lot.
5	**Chad**	The motivation for the execution Programme: It is **necessary to have a team dedicated to planning**, of three to five competent engineers, chosen through well-defined criteria, is selected and trained on planning tools such as LEAP, MAED, EBS, MESSAGE, … to enable good planning
6	**Congo**	NA
7	**DRC**	This training, for SNEL SA, which is the consulting body of the Congolese government, will serve to equip the Studies, Planning, Norms and Standards Department, with **improvement in the way of carrying out the study of energy demand with appropriate tools, modeling to develop master plans, with a view to establishing the master plan** by specifying inputs, methodology and outputs
8	**Equatorial Guinea**	NA
9	**Gabon**	As explained above, Gabon does not have a specific legal body for energy planning. Several reasons can explain this, but the most relevant is the **lack of staff trained in planning tools within the Directorate General of Energy**, given that it is the latter that is responsible for establishing the country's energy policy. Indeed, it is to avoid visual piloting that **this training will help equip sector players with the tools they need to build policies and ensure their successful implementation**. In other words, the training on energy planning will allow us to have: a clear understanding of the challenges (technical, economic, political and environmental) of the sector and of the motives for State interventions and their role in the process; mastery of the tools necessary for analyzing the energy situation, developing the sector and operating it in the context of sustainable development; contribution to the exchange of experiences and to enhanced cooperation between CEMAC countries
10	**Rwanda**	It would **increase the knowledge of use of especially MESSAGE**, as there is **currently one person who uses it constantly in their daily job; others have not had an opportunity to directly use it or be exposed to it in order to support its widespread deployment and use in the utility**
11	**Sao Tome & Principe**	The concessionaire and the energy department of the ministry, with technicians well trained in planning, are an asset, because we have enormous difficulties in this matter. We therefore understand that these training actions come at the right time and **will allow us to have a greater capacity and knowledge in the planning as well as in the management of the specific program (software).**

5. 3 Appendix III: Participants

Country	Institution	Name	Role
Angola	Ministério da Energia e Águas	Kiala Pierre	Head of International Cooperation
Angola	RNT - Rede Nacional de Transporte de Electricidade	TSHAMA Leonardo Kilele	Power System Planning Engineer in Transmition System Utilite
Angola	RNT - Rede Nacional de Transporte de Electricidade	Patós Henrique Afonso	Division chief of Network planning
Angola	RNT - Rede Nacional de Transporte de Electricidade	ANTÓNIO ELIAS BALTAZAR MONIZ	Head of Department of Prospective Studies of the Electric System
Angola	RNT - Rede Nacional de Transporte de Electricidade	MANUEL ERICSON DA COSTA DOMINGOS	Power System Planning Engineer in Transmition System Utilite
Angola	RNT - Rede Nacional de Transporte de Electricidade	Joana Marinho	Power System Planning Engineer in Transmition System Utilite
Angola	Ministério da Energia e Águas	ANTÓNIO JOAQUIM RAMOS DE ALMEIDA	Técnico especializado
Angola	IRSEA	Adérito Pedro Manico	Engineer
Angola	IRSEA	Alberto Evaristo Fernandes	Engineer
Angola	IRSEA	Mário Domingos Bravo	Engineer
Burundi	REGIDESO	HARIMENSHI Lazare	Chef de Service Equipment Electricite
Burundi	REGIDESO	Aloys NDAYIKUNDIRE	Chef de Service Planification et Gestion des Investissements
Burundi	REGIDESO	NTIRAMPEBA Felix	Chef de Cellule support technique et normalisation du Service Equipement Electricite
Burundi	REGIDESO	ARAKAZA Audifax	Ingenieur d'Appui a la Cellule Travaux Electricite du Service Equipement Electricite
Burundi	REGIDESO	SAKUBU Osias	Chef de Région Nord à la REGIDESO
Burundi	REGIDESO	YAMANA Claudine	Ingénieur d'Appui à la Cellule support technique et normalisation du Service Equipement Electricité
Burundi	REGIDESO	KUMWANI Charles	Chef de service Développement des Ressources Humaines
Cameroon	ENEO	Paul Bertrand Ambassa Ambassa	Responsible du Pole Regulation
Cameroon	ENEO	Cedric De Lille Ekenglo Ewondjo	Ingenieur Charge d'Etudes Principal
Central African Republic	ENERCA	BEMANA NGUEOUELE Yannick	Charge d'Etudes en Developpement a la Direction des Etudes et Distribution

Central African Republic	ENERCA	BAYALE-TOUMA Fabrice Gildas	Directeur des Etudes et Distribution par interim
Central African Republic	ENERCA	BA-THOMAS Brice Berenger	Charge d'Etudes en Developpement, Planification et nouvelle Technologie
Central African Republic	ENERCA	NERGUIDIMA Mathurin	Charge d'etudes et du suivi des projets sur financement de la Banque Mondiale a la Direction de Production et du Transport de l'ENERCA
Central African Republic	ENERCA	Julien Grace a Dieu BALLET	Production Hydraulique et Transport de Boali
Central African Republic	Ministry of Energy	Moussa Ousman	Director General
Central African Republic	Ministry of Energy	Bruno Serge GBAGODO	Directeur des Etudes, des Statistiques et de la Planification
Central African Republic	Ministry of Energy	Nestor PAGOYO	Chef de Service de la Bioenergie et Geothermie
Central African Republic	Ministry of Energy	Herbert Corneille MBAMBALI MBAYE	Chef de Service des Micro et Mini-Hydroelectricite
Central African Republic	Ministry of Energy	Guy-Aime Mathias BIADI	Chef de Service de Gestion des Ressources Energetiques
Central African Republic	Ministry of Energy	Max Giovanni MAMADOU PANDJI ZOTOUA	Expert Technique a la Cellule de Coordination du Programme d'Electrification Rurale
DRC	SNEL - Direction PLANIFICATION DE DEVELOPPEMENT	Sylvain Bondekwe Amisi	Planificateur Chargé du PLAN DIRECTEUR ET PROGRAMME D'INVESTISSEMENTS PRIORITAIRES
DRC	SNEL - Direction PLANIFICATION DE DEVELOPPEMENT	David MUDIAMPIMPA BIENKO	Chargé du PLAN SECTORIEL TECHNIQUE ET SUBSTITUTION DE L'ENERGIE
DRC	Ministre d'État des Ressources Hydrauliques et Électricité	Thérèse Kongolo	Conseillere
DRC	Ministre d'État des Ressources Hydrauliques et Électricité	NKUMBI wa NKUMBI Elie	Autorité de Régulation de l'Electricité
DRC	Ministre d'État des Ressources Hydrauliques et Électricité	Jean Jean MBULA	Chargé de la base des données
DRC	SNEL - Direction PLANIFICATION DE DEVELOPPEMENT	Tonton BOKETSU LOKANGA	Chargé du plan Secteur Technique et Substitution Energétique du Département Etudes, Planification, Normes et Standards
DRC	Ministre d'État des Ressources Hydrauliques et Électricité	Papy ANANGI DAMBAKOKO	Agent au Secrétariat Général au Ministère des Ressources Hydrauliques et Electricité de la RDC
DRC	Ministre d'État des Ressources Hydrauliques et Électricité	Popol BIABIA MUMPELE	Conseillère en charge de l'électricité

DRC	Ministre d'État des Ressources Hydrauliques et Électricité	Alain DIBA	NA
DRC	SNEL	Papy Boniface MBANGU MUZELE	Ingénieur au Département de Production
DRC	Ministre d'État des Ressources Hydrauliques et Électricité	Bwambale Vayighonga McNally	Chef de Cellule chargé des projets du Programme de centrales solaires avec l'inde au sein de la Coordination Nationale de l'Energie Solaire
Gabon	Ministry of Water and Energy (Direction Generale de L'Energie)	OKOUMA Alexis Léandre	Chef de Service Règlementation et Normalisation
Gabon	Ministry of Water and Energy (Direction Generale de L'Energie)	OBAYE Gigamesh Rosny	Chargé d'étude a la Direction des Energie Nouvelles et Renouvelables
Rwanda	Energy Utility Corporation Limited	TUYIZERE VALENCE	Senior Engineer System Operations
Rwanda	Energy Utility Corporation Limited	NTARE RONALD	Network Planning Engineer
Rwanda	Energy Utility Corporation Limited	NKUSI Geoffrey	Network Protection Specialist
Rwanda	Energy Utility Corporation Limited	KANYAMANZA Regis	Network Planning Engineer
Rwanda	Renewable Energy Group (REG)	MUTESI BISANGWA Rebecca	Planning Engineer
Chad	CAPP	Atadet Azarak	Ingénieur Électricien; DESS en gestion; Assistant Technique du SP/PEAC