



Update of the ECOWAS revised master plan for the development of power generation and transmission of electrical energy

Final Report

*Volume 3: Challenges and Action Plans
for electricity companies*

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TABLE OF ACRONYMS

ADB	<i>Asian Development Bank</i>
AFD	<i>Agence française de développement</i>
BIO	<i>Biomass Plant</i>
CAPEX	<i>Capital Expenditure</i>
CAPP	<i>Central Africa Power Pool</i>
CC	<i>Combined Cycle</i>
CEB	<i>Communauté Electrique du Bénin</i>
CEET	<i>Compagnie Energie Electrique du Togo</i>
CFB	<i>Circulating Fluidized Bed</i>
CIE	<i>Compagnie Ivoirienne d'Electricité</i>
CI-ENERGIES	<i>Côte d'Ivoire Energies</i>
CLSG	<i>Côte d'Ivoire – Liberia – Sierra Leone – Guinea loop</i>
COAL	<i>Coal</i>
COD	<i>Commercial operation Date</i>
CSP	<i>Concentrated Solar Plant</i>
CUE	<i>Cost of Unserved Energy</i>
DAM	<i>with Dam</i>
(D)DO	<i>Ordinary Diesel</i>
DFI	<i>Development finance institutions</i>
DI	<i>Diesel group</i>
DNI	<i>Direct Normal Irradiation</i>
DSO	<i>Société de distribution d'électricité (Distribution System Operator)</i>
EAGB	<i>Electricidade e Aguas da Guine-Bissau</i>
ECOWAS	<i>Economic Community of West African States</i>
EDG	<i>Electricité de Guinée</i>
EDM	<i>Electricité du Mali</i>
EDSA	<i>Electricity Distribution Supply Authority</i>
(E)ENS	<i>(Expected) Energy Not Served</i>

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EGTC	<i>Electricity Generation and Transmission Company</i>
EIB	<i>European Investment Bank</i>
ERERA	<i>Ecowas Regional Electricity Regulatory Authority</i>
EU	<i>European Union</i>
EUR (or €)	<i>Euro</i>
FCFA	<i>Francs CFA</i>
FSRU	<i>Floating Storage and Regasification Unit</i>
GDP	<i>Gross Domestic Product</i>
GENCO	<i>GENeration COporation</i>
GHI	<i>Global Horizontal Irradiation</i>
GO	<i>Gasoil</i>
GRIDCo	<i>Electricity Transmission Company of Ghana</i>
GT	<i>Gas Turbine</i>
GWh	<i>Giga Watt heure</i>
HFO	<i>Heavy fuel oil</i>
HRSG	<i>Heat Recovery Steam Generator</i>
HYD	<i>Hydroelectric plant</i>
ICC	<i>Information and Coordination Center</i>
IEA	<i>International Energy Agency</i>
IFI	<i>International Funding Institution</i>
IMF	<i>International Monetary Fund</i>
IPP	<i>Independent Power Producer</i>
IPT	<i>Independant Power Transporter</i>
IRENA	<i>International Renewable Energy Agency</i>
JET	<i>Jet A1</i>
LCO	<i>Light Crude Oil</i>
LCOE	<i>Levelized Cost of Electricity</i>
LEC	<i>Liberia Electricity Corporation</i>
LFO	<i>Light Fuel Oil</i>
LHV	<i>Low Heating Value</i>

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LNG	<i>Liquefied Natural Gas</i>
LOLE	<i>Loss of Load Expectation</i>
LOLP	<i>Loss of Load Probability</i>
MMBTU	<i>Million British Thermal Unit</i>
MMCFD	<i>Million Cubic Feet per Day</i>
MRU	<i>Union de la Rivière Mano (Mano river Union)</i>
N/A	<i>Not Available</i>
NAWEC	<i>National Water and Electricity Company</i>
NBA	<i>Niger Basin Authority</i>
NDC	<i>National Determined Contribution</i>
NG	<i>Natural Gas</i>
NIGELEC	<i>Société nigérienne d'électricité</i>
NTP	<i>Notice to proceed</i>
O&M	<i>Operation & Maintenance</i>
OC	<i>Open Cycle</i>
OECD	<i>Organisation for Economic Co-operation and Development</i>
OLTC	<i>On Load Tap Changer</i>
OMVG	<i>Organisation de Mise en Valeur du fleuve Gambie</i>
OMVS	<i>Organisation de Mise en Valeur du fleuve Sénégal</i>
ONEE	<i>Office National de l'Electricité et l'Eau Potable (Morocco)</i>
OPEX	<i>Operating Expenditure</i>
PC	<i>Pulverized Coal</i>
PPA	<i>Power Purchase Agreement</i>
PPP	<i>Private Public Partnership</i>
PSS	<i>Power System Stabilizer</i>
pu	<i>per unit</i>
PV	<i>Photovoltaic plant</i>
RES	<i>Renewable Energy Sources</i>
ROR	<i>Run of river</i>
SAIDI	<i>System Average Interruption Duration Index : Indicateur de la durée moyenne de coupures sur le système</i>

SAIFI	<i>System Average Interruption Frequency Index : Indicateur de la fréquence moyenne de coupures sur le système</i>
SBEE	<i>Société Béninoise d'Energie Electrique</i>
SENELEC	<i>Société nationale d'électricité du Sénégal</i>
SOGEM	<i>Société de Gestion de l'Energie de Manantali</i>
SONABEL	<i>Société nationale d'électricité du Burkina</i>
ST	<i>Steam Turbine</i>
SV (or VS)	<i>Standard Value</i>
SVC	<i>Static Var Compensation</i>
TCN	<i>Transmission Company of Nigeria</i>
TSO	<i>Transmission System Operator</i>
USD (or US\$ or \$)	<i>US Dollar</i>
VRA	<i>Volta River Authority</i>
WAGP(A)	<i>Western Africa Gas Pipeline (Association)</i>
WAPP	<i>West Africa Power Pool</i>
WT	<i>Wind Farm</i>

1. INTRODUCTION

1.1. Context

The Economic Community of West African States (ECOWAS) is a regional community with a surface of 5.1 million of square km which represents about 17% of the African continent. With a population of more than 300 million inhabitants in 2017, ECOWAS Member States are home to about one-third of the population of sub-Saharan Africa.

ECOWAS has been created with a mandate of promoting economic integration in all fields of activity of the constituting countries. The fifteen-member countries making up ECOWAS are Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, The Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Sierra Leone, Senegal and Togo. The ECOWAS treaty (also known as treaty of Lagos) established the Community during its signature in Lagos (Nigeria) on May 28th, 1975.

One of the most important steps of economic integration in the field of energy was the creation, in 2006 of the Western African Power Pool (WAPP). The WAPP promotes the integration of the national power systems of the fourteen inland countries into a unified regional electricity market with the ultimate goal of providing, in the medium and long-term, a regular and reliable energy at competitive cost to the citizenry of the ECOWAS region

However, the region, which is characterized by a great diversity in terms of culture, language, demography and resources, faces enormous challenges in providing access to sustainable energy for its population. But the 15 ECOWAS Member States are driven by a common desire to offer “affordable, reliable, sustainable and modern energy for all”, as per the three main goals of the Sustainable Energy for All (SE4All) initiative, launched by the United Nations Secretary-General.

West-African countries have a great opportunity to reach their objectives thanks to the vast untapped potential in renewable energy (including solar, wind, bioenergy and hydro-power). The Energy Transformation will happen both on-grid and off-grid. It involves the development of mini-grids with hybrid power generation, centralized and decentralized renewable projects potentially coupled with a more flexible demand side, enabled by storage and smart-metering technologies.

Several initiatives like the *African Renewable Energy Initiative* and the *ECOWAS policy on Renewable Energy* support this transformation. However, such a revolution requires financing, leadership and international cooperation. In this context the West African Power Pool is playing a significant role by supporting the development of major energy projects in the region.

1.2. Objectives of the project

The West African Power Pool promotes cooperation and supports the development of regional projects. In 2012, the Authority of the ECOWAS Heads of State and Government approved, through Supplementary Act A/SA.12/02/12, a list of 59 Priority Projects for the subregion that emanated from the update of the ECOWAS Revised Master Plan for the Generation and Transmission of Electrical Energy prepared by Tractebel.

Considering the evolution of

- the energy landscape,
- the socio-economic context of West Africa over the last 5 years and
- the difficulty in mobilizing public and concessional financing in the sub-region, the development of the power system in West Africa deviated from what was foreseen in 2011. A lot of challenges affect the utilities efficiency on several aspects including financial, regulatory, technical and organizational points of view.

Another key parameter which should affect the energy development roadmap of WAPP region is the expected increase penetration of Renewable Energy Sources (RES). Thanks to the significant decrease of costs and increased willingness for the transition to sustainable energy, many WAPP countries have revised their RES targets and launched RES projects.

Consequently, while some flagship generation and transmission projects were developed in the region, some of them are still under development or were strongly delayed while, in parallel new non-anticipated projects emerged.

In this context, the study presents four different main objectives:

- Assessing the **implementation status** of the priority projects identified in 2011, understanding the main challenges and barriers to the development of these projects and identifying the lessons learned that will be taken into account when updating the Master Plan;
- Identifying the **main challenges and critical factors** affecting the performance of utilities in their activities as a public service and proposing a new action plan and mitigation measures to address these constraints in a long-term perspective;
- Assessing the opportunities and constraints for the deployment of **Renewable Energy Sources** in the sub-regional power system (potential, economics, grid constraints...);
- Presenting a clear, comprehensive and coherent view of the future development of power generation and transmission facilities with a list of **priority projects** for West Africa that takes into account the new drivers of electricity generation and consumption, while integrating the current development of the power system at national and regional level and while providing recommendations for facilitating the implementation of the projects.

This will lead to an **update of the ECOWAS Master Plan for Generation and Transmission of Electrical Energy**, a comprehensive study providing a rational basis for decision making and implementation in the power sector.

1.3. Organisation of the report for the update of the ECOWAS revised master plan for the development of power generation and transmission of electrical energy

The report is divided into five main volumes corresponding to the five main deliverables of the study.

VOLUME 1: Executive Summary

Volume 1 is the synthesis of the Final Report of the update of the revised ECOWAS Master Plan. It contains the main recommendations of the study concerning the future development of the electricity generation and transmission infrastructures as well as a list of priority projects and the implementation strategy of these projects.

VOLUME 2: State of play of the current situation of the electricity system and perspectives

Volume 2 consists of a synthesis of data collected and assumptions used in the context of this project, and in particular for the update of the generation and transmission master plan.

VOLUME 3: Challenges and Action Plans for electricity Companies

Volume 3 aims at presenting the main challenges and critical factors affecting the performance and the sustainability of utilities members of WAPP and at recommending a new action plan and mitigation measures to address these critical factors from a transversal perspective...

VOLUME 4: Generation and Transmission Master Plan

Volume 4 is devoted to the results of the generation and transmission master plan: It presents a robust and economically optimal development plan while taking into account the current state of the energy sector in West Africa and opportunities for developing renewable energy sources in the region while ensuring the technical stability of the interconnected system

VOLUME 5: Priority Investment Program and Implementation Strategy

Volume 5 focuses first on carrying out a review of the implementation of the ECOWAS 2012-2025 Master Plan and assessing the causes of the gaps between what was initially planned and what was concretely achieved, allowing some effects to be taken into consideration for the development of the 2017-2033 updated master plan. Then, a new list of priority investment projects is drawn up on the basis of the generation-transmission master plan and a strategy is recommended for the progressive implementation of these projects.

1.4. Objectives of Volume 3

The objective of this Volume is to recommend corrective measures to address the identified challenges and critical factors of the WAPP member utilities.

Beyond the techno-economic model developed as part of this update, focus is put on identifying the challenges and critical factors affecting the WAPP Member Utilities. This approach first involves identifying and prioritizing difficulties and then proposing corrective measures to deal with them.

Ces mesures correctives cherchent donc à proposer des actions concrètes les plus efficaces possibles afin d'adresser au mieux les facteurs critiques dans le cadre de l'implémentation du Plan Directeur.

As a reminder, WAPP member companies are those shown in the table below. The bluish companies are those of public service for which an action plan is presented in Appendix.

Designation of the utility	Full name of the company	Country
SBEE	Société Béninoise d'Energie Electrique	Benin
CEB	Communauté Electrique du Bénin	Benin / Togo
SONABEL	Société Nationale d'Electricité du Burkina Faso	Burkina Faso
CI ENERGIES	Côte d'Ivoire Energies	Ivory Coast
CIE	Compagnie Ivoirienne d'Electricité	Ivory Coast
NAWEC	National Water & Electricity Company	Gambia
CENIT Energy	CENIT Energy	Ghana
CENPOWER	CEN Power	Ghana
ECG	Electricity Company of Ghana	Ghana
GRIDCO	GRIDCO	Ghana
GTG Energy	GTG Energy	Ghana
GTS Engineering Services	GTS Engineering Services	Ghana
KARPOWERSHIP	KARPOWERSHIP GHANA	Ghana
NEDCO	Northern Electricity Distribution Company	Ghana
VRA	Volta River Authority	Ghana
EDG	Electricité De Guinée	Guinea
EAGB	Empresa de Eletricidade e Águas da Guiné-Bissau	Guinea Bissau
LEC	Liberia Electricity Corporation	Liberia
EDM-SA	Energie Du Mali SA	Mali

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Designation of the utility	Full name of the company	Country
SOGEM	Société de Gestion de l'Energie de Manantali	Mali
ONE	Office Nationale de l'Electricité	Morocco
NIGELEC	Société Nigérienne d'Electricité	Niger
MAINSTREAM	Mainstream	Nigeria
NBET	Nigerian Bulk Energy Trading	Nigeria
TCN	Transmission Company of Nigeria	Nigeria
SENELEC	Société Nationale d'Electricité du Sénégal	Senegal
EDSA	Electricity Distribution and Supply Authority	Sierra Leone
CEET	Compagnie Energie Electrique du Togo	Togo
CONTOURGLOBAL	Contour Global Togo	Togo

Table 1: Utilities members of the WAPP
Source: WAPP website

1.5. Methodology

1.5.1. General methodology

Study of the electricity sector in the WAPP member countries

A dedicated analysis of the electricity sector in the 14 countries of the WAPP was carried out. This analysis focuses on the following points:

- The organization and the architecture of the value chain of the electricity sector
- The allocation of the sovereign and operational functions between the various actors of the sector
- The regulatory context and electricity sector development plans
- Integration of new renewable energies into the country energy mix
- The efficiency and performance of utilities including:
 - Corporate governance of the sector
 - Technical efficiency (production, transport, distribution)
 - Financial and commercial efficiency (costs, rates, billing, recovery and financial health)
- Critical factors specific to the country

Analysis of identified challenges and critical factors

On this basis, the different challenges and critical factors identified were analyzed in order to confront them. These challenges and critical factors are characterized in this study according to three axes:

- Their **impacting** nature
To what extent does the critical factor impact the efficiency, performance and sustainability of corporate services;
- Their **cross-cutting** nature.
To what extent does the critical factor appear transversely between the different countries studied;
- Their **addressable** nature.
To what extent can the critical factor be addressed by utilities in a reasonable timeline and with reasonable means;

With this ranking of critical factors, a prioritization can be achieved allowing to classify the critical factors according to their degree of importance in view of the Master Plan and the economy of the sector more generally.

Measures and actions to address the critical factors

By capitalizing on feedbacks, a series of measures and actions has been established. This series of actions comes from two different sources:

- Strategies already underway or planned by WAPP member utilities;
- An international benchmark of best practices, key success factors and lessons learned for transposable situations.

Once the series of measures and actions are established their analysis is carried out. The actions are analyzed according to two axes:

- Their ability to effectively deal with the critical factor,
- Their ability to act on a panel of critical factors rather than just one.

Actions to best address the priority critical factors are then retained.

Corrective action plans

Finally, corrective action plans for all WAPP utility companies are established and synthesized in the form of individual fact sheets. These sheets in Appendices of this volume present:

- Identified priority critical factors affecting the effectiveness, performance and sustainability of the company's services;
- Measures and actions adapted to critical factors;
- Sub-activities to be considered as part of the implementation of the actions;
- An indicative budget;
- An indicative timetable;
- Partners for implementation.

1.5.2. Actors and organizations consulted in the project

Consultation of the actors of the electricity sector in West Africa was conducted. The consultation was conducted through meetings in the fourteen countries of the West Africa region as well as through telephone meetings, particularly with the donors involved in the sector. Stakeholders consulted are listed in the following table:

National entities

Country	Entities met
Benin	Société Béninoise d'Energie Electrique (SBEE) Communauté Electrique du Bénin (CEB) Ministère de l'Energie et des Mines
Burkina Faso	Direction Générale des Energies Conventionnelles – Ministère de l'Energie et des Mines (DGE) Société nationale d'électricité du Burkina Faso (SONABEL)
Ivory Coast	Côte d'Ivoire Energies (CI-ENERGIES) Direction Générale de l'Energie (DGE) Autorité Nationale de Régulation du Secteur de l'Electricité de Côte d'Ivoire (ANARE-CI) Compagnie Ivoirienne d'Electricité (CIE) Association des Sociétés d'Electricité d'Afrique (ASEA)
The Gambia	Ministère de l'énergie National Water and Electricity Company (NAWEC) Gambia Public Utilities Regulatory Authority (PURA)
Ghana	GRIDCo Volta River Authority (VRA) Energy Commission Ministry of Energy
Guinea	Electricité de Guinée (EDG) Administration et Contrôle des Grands Projets et Marchés Publics (ACGPMP) Direction Nationale de l'Energie (DNE) Autorité de Régulation des secteurs de l'Electricité et de l'Eau Potable (ARSPEE) Agence Guinéenne d'Electrification Rurale (AGER)
Guinea Bissau	Empresa de Eletricidade e Águas da Guiné-Bissau (EAGB) Direction Générale de l'Energie
Liberia	Liberia Electricity Corporation (LEC) Ministry of Lands, Mines and Energy of Liberia (MLME) Rural and Renewable Energy Agency (RREA)
Mali	Electricité du Mali (EDM-SA) Ministère de l'énergie et de l'eau Société de Gestion de l'Energie de Manantali (SOGEM)
Niger	Direction Générale– Ministère de l'Energie (DGE)

National entities

Country	Entities met
	Société nigérienne d'électricité (NIGELEC)
Nigeria	Transmission Company of Nigeria (TCN) Nigerian Electricity Regulatory Commission (NERC) Nigeria Bulk Electricity Trader (NBET) Ministry of Energy
Senegal	Société nationale d'électricité du Sénégal (SENELEC) Commission de Régulation du Secteur de l'Électricité (CRSE) Ministère du Pétrole et de l'Energie (MPE)
Sierra Leone	Société de production et de transmission d'électricité (EGTC) Autorité de distribution d'électricité (EDSA) Commission de réglementation de l'électricité et de l'eau (EWRC) Ministère de l'énergie
Togo	Compagnie Energie Electrique du Togo (CEET) Communauté Electrique du Bénin (CEB) Ministère de l'Energie et de l'Eau du Togo, DGE Autorité de Réglementation du Secteur de l'Electricité (ARSE) Agence togolaise d'électrification rurale et des énergies renouvelables (AT2ER),
Multistate	TRANSCO CLSG

Table 2: National entities met

Regional entities

Entity	Consultation carried out
CEDEAO	During the mission to Nigeria
OMVG	During the mission to Senegal
OMVS	During the mission to Senegal

Table 3: Regional entities met

External organizations

Organization	Program / projet
World Bank	Project leader for: "Emergency Water and Electricity Services in Guinea Bissau" Project leader for: "Gambia & Senegal Electricity Sector Support Project" Project leader for the development of solar capacity in West Africa
KfW	Project leader for: « Performance Study for five WAPP utilities »
AFD	Energy pole manager – Vietnam agency Project manager – Ethiopia agency

Table 4: External organizations met

The consultations helped highlighting to what extent the critical factors identified affect the efficiency, performance and sustainability of corporate services in the electricity sector. These consultations also made it possible to evaluate the effectiveness of certain measures and actions implemented in the WAPP area or in similar contexts.

2. OVERVIEW: ECONOMY AND ELECTRICITY SECTOR IN WEST AFRICA

2.1. Macroeconomic indicators

An important imbalance exists in the region between the different member countries of the WAPP. The electricity sector is a striking example of this imbalance. For example, in 2015, out of the 50,000 GWh of electricity consumed around 42,500 GWh were consumed only by Nigeria, Ghana and Côte d'Ivoire. Nigeria alone was responsible for 57% of the region's total consumption of nearly 28,500 GWh.

The following are some macroeconomic indicators to put the study in context.

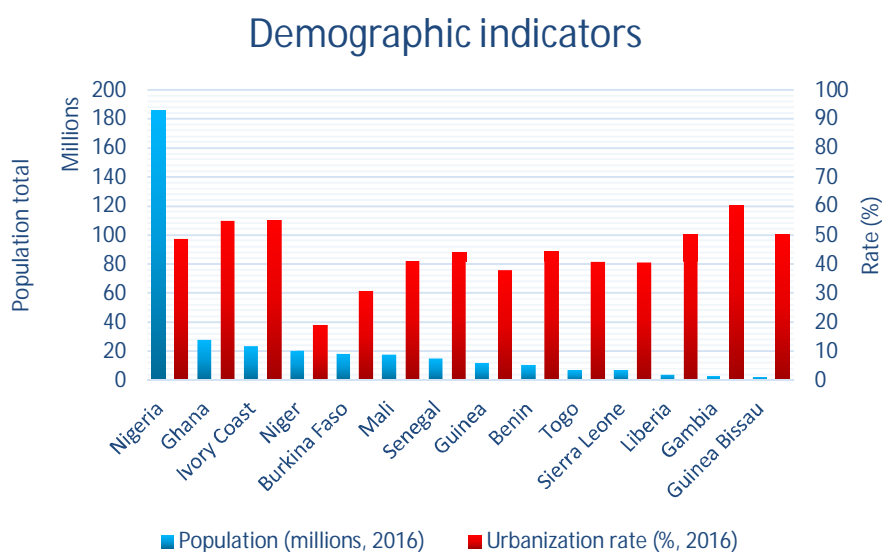


Figure 1: Demographic Indicators of ECOWAS Member Countries
World Bank data for the year 2016 (World Development Indicators, 2018)

Economics indicators

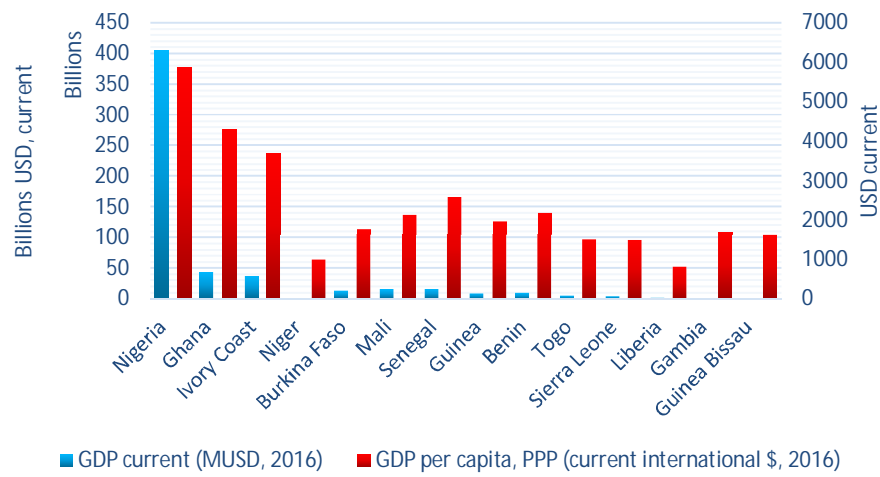


Figure 2: Indications on the economy of ECOWAS member countries
World Bank data for the year 2016 (World Development Indicators, 2018)

2.2. Governance and Institutional Framework

The different organizational patterns of the electricity sector value chain in the WAPP area are summarized below.

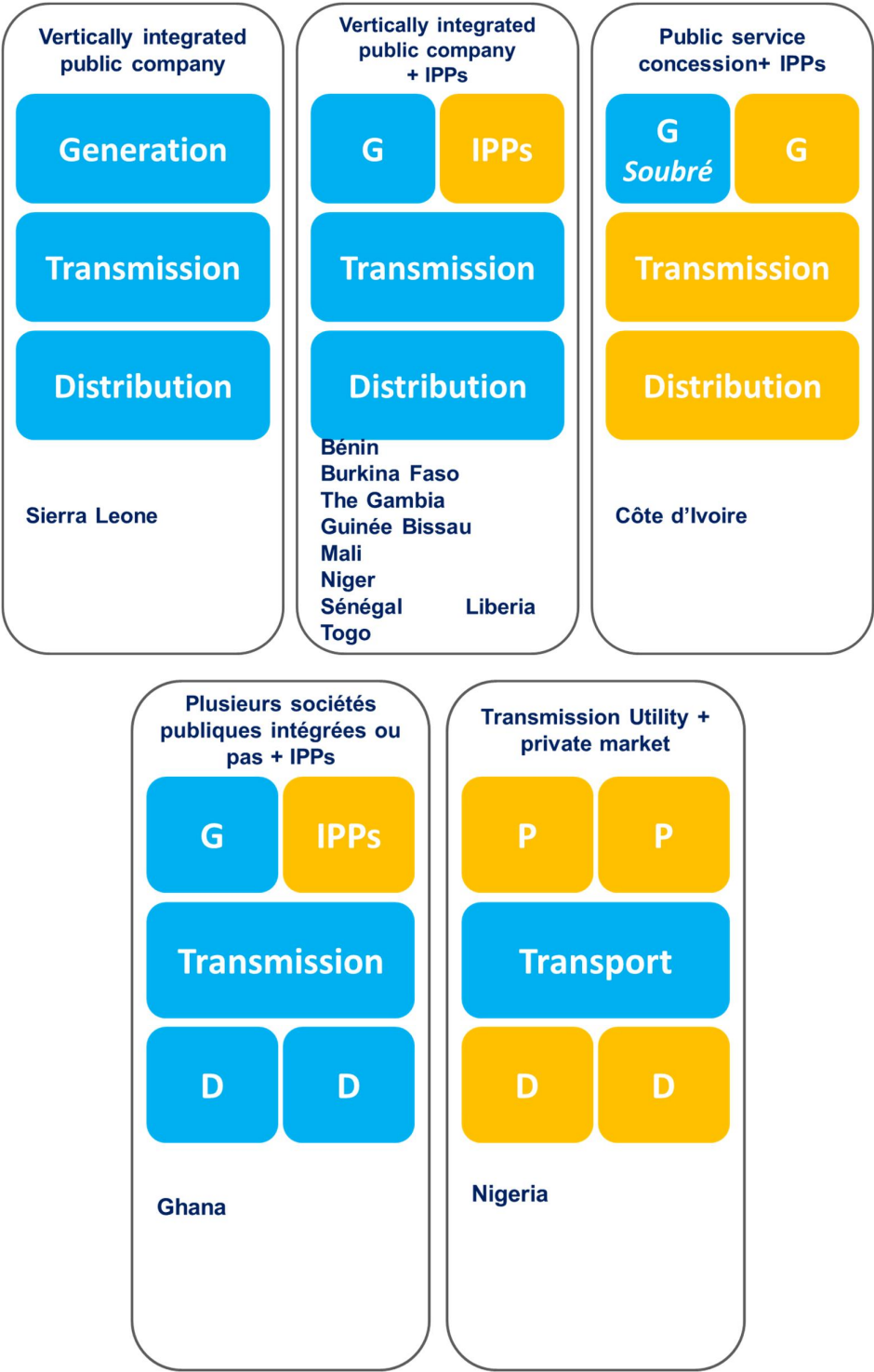


Figure 3: Organization plans of the electricity sector of the countries of the WAPP area

- Blue category means companies are public
- Yellow category means that companies are private
- The presence of IPPs in the production component means that the organization of the sector allows IPPs to intervene (without necessarily being the case).

A detailed description of the allocation of the sovereign and operational functions between the different actors of the electricity sector is presented for each country in the "country annexes" related to this report.

2.3. Technical efficiency

Technical efficiency refers to the technical performance of companies in the areas of generation, transmission and distribution.

2.3.1. Generation

Efficiency of generation refers to the ratio between installed capacity and available capacity; but also to the balance of the energy mix.

The two figures below show the relationship between installed capacity and available capacity:

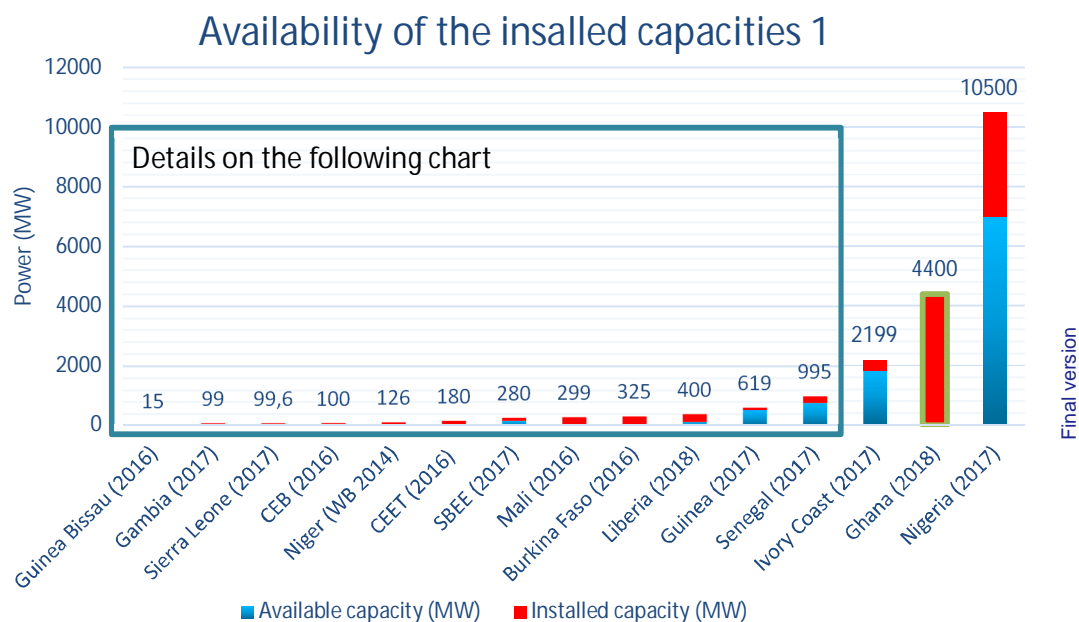


Figure 4: Availability of installed capacity 1

Ivory Coast, Ghana and Nigeria together account for approximately 80% of the installed capacity of the WAPP area. To facilitate the reading of this diagram, another scheme is proposed below, disregarding these three countries.

Availability of the installed capacities 2

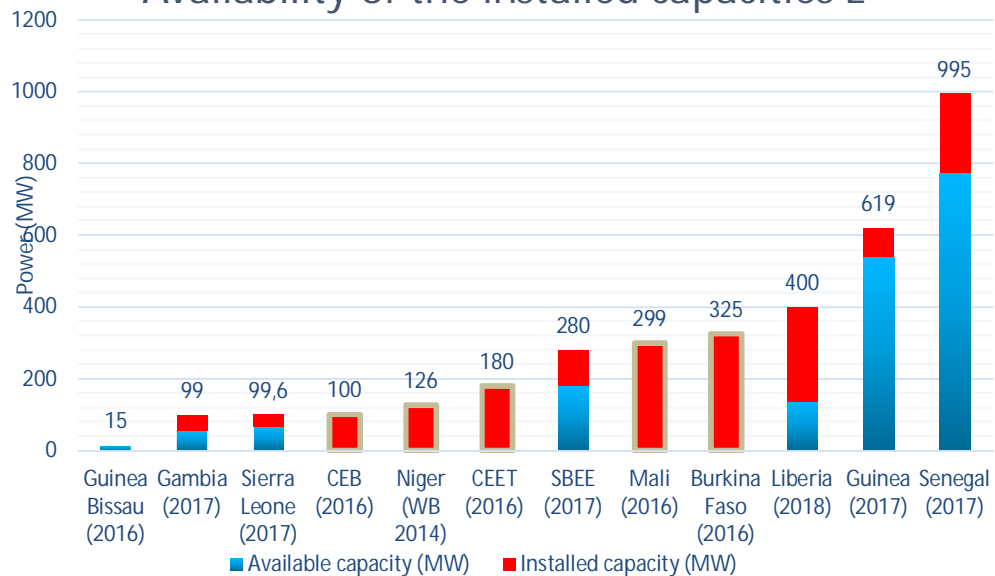
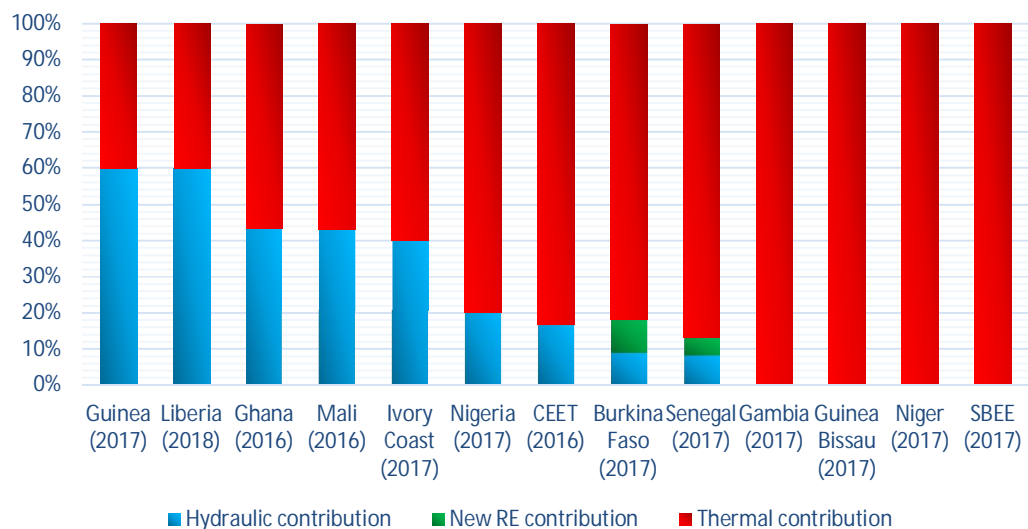


Figure 5: Availability of installed capacity 2

Concerning the CEB, Niger, CEET, Mali, Burkina Faso, Liberia and Ghana, data on the availability of production capacities were not known. Only the installed capacity for these countries is represented.

The energy mix in **installed capacity** adopted by the different countries in the zone is shown in the figure below:

Energy mix



Final version

Figure 6: Energy mix of WAPP member countries

This figure shows that the energy mix is mainly dominated by thermal generation assets (gas, diesel, HFO, LFO). The rest of the mix concerns hydropower assets with the recent emergence of new renewables (solar PV).

2.3.2. Transmission

The efficiency of the transmission corresponds here to the interruptions and load-shedding on the public network. These interruptions are evaluated according to two axes: their numbers and their durations (respectively SAIFI and SAIDI).

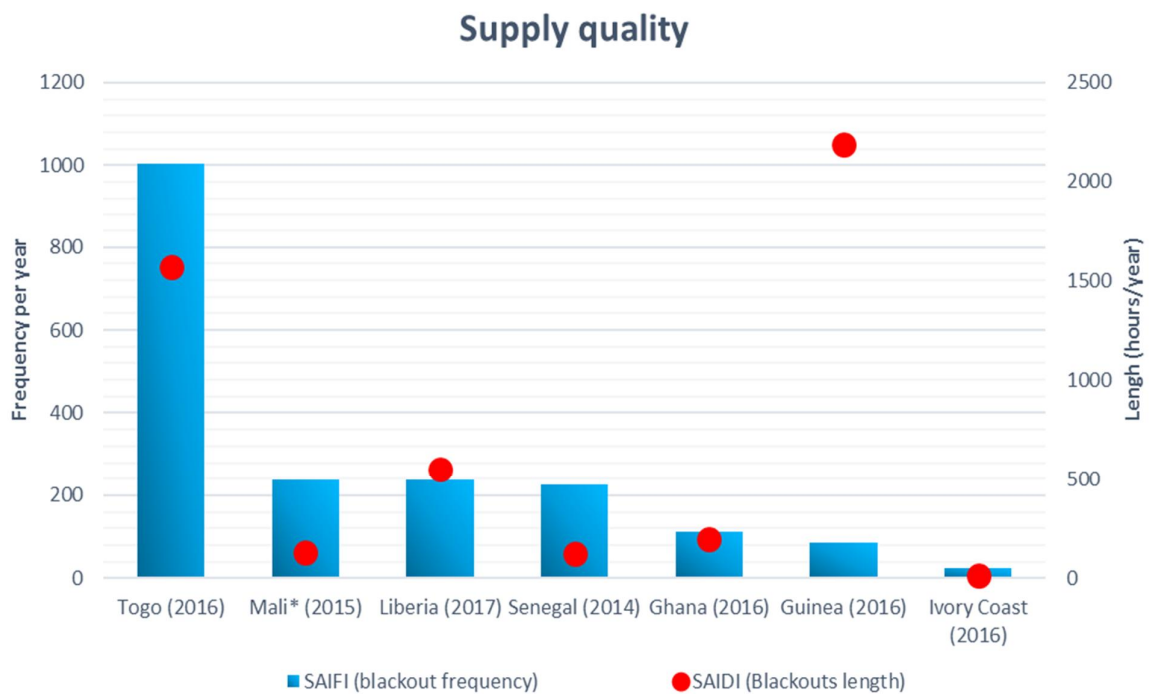


Figure 7: Supply quality – SAIFI and SAIDI

SAIFI and SAIDI data were not available for all the countries studied.

** For Mali the results concern only the 150 and 225 kV network.*

Among the countries whose information was available:

- Togo has numerous interruptions lasting a long period of time;
- Mali, Liberia and Senegal show common constraints;
- Guinea has significantly reduced its interruptions frequencies, but they remain relatively long;
- Côte d'Ivoire has a very good supply quality.

2.3.3. Distribution

Efficiency of distribution is looked at through two aspects:

- Access rate of the population to electricity and,
- losses on transmission and distribution networks.

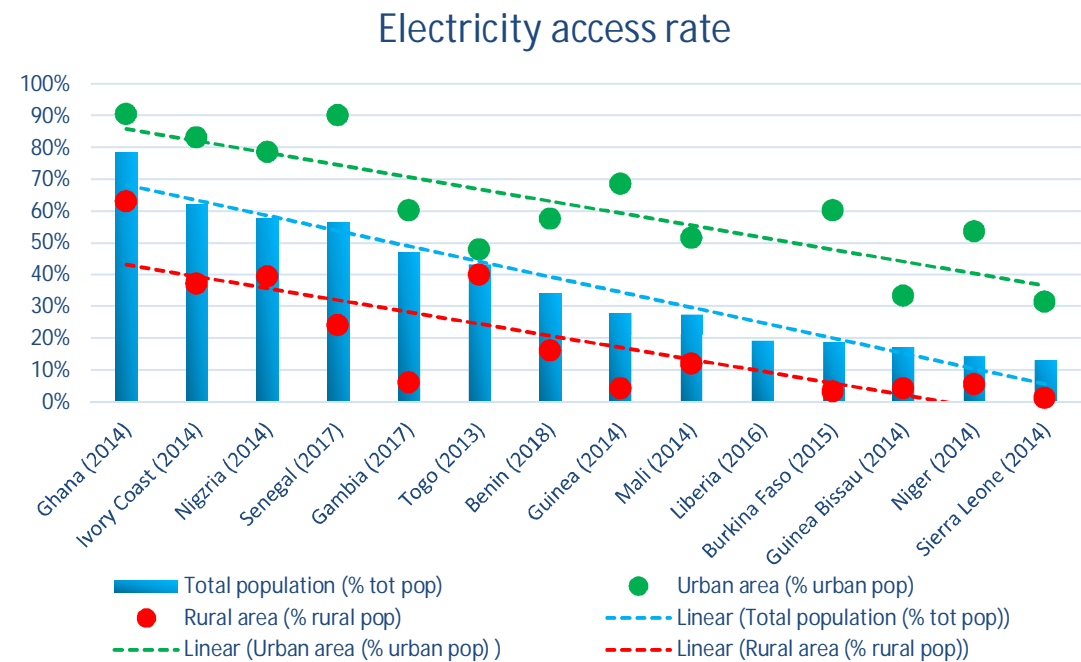


Figure 8: Rate of access to electricity of the population
World Bank data for the year 2016 (World Development Indicators, 2018)

The access rate of electricity to the population is relatively variable according to the countries considered. It ranges from almost 80% for Ghana to less than 10% for Liberia. While the rate of access to electricity in urban areas follows the same trend as access for the total population, the rate of access to rural areas diverges more than one country to another.

Losses on transmission and distribution grids

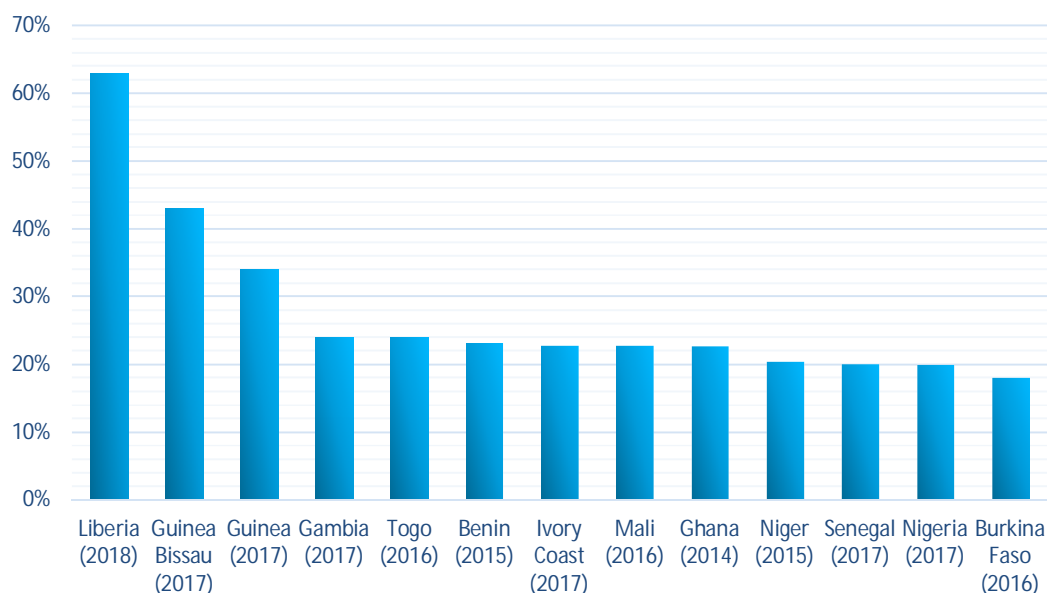


Figure 9: Rates of technical and non-technical losses on transmission and distribution networks

The loss rate on the transmission and distribution networks ranges from 18% for Burkina Faso to 43% for Guinea Bissau. However, most countries are in a narrow range between 20% and 26% of losses.

This rate considers both technical and non-technical losses. The details of these two variables are more fully discussed later in the report as they are critical factors in the performance of utility services.

2.4. Financial efficiency

Financial efficiency refers here on the one hand to the tripartite relationship of cost, tariff and billing and, on the other hand, to the financial health of the sector.

2.4.1. Costs, tariffs and billing

The following information is included here:

- the cost of the electricity service,
- the average rates charged to end consumers and
- bill collection rate.

Service Cost and Electricity Tariff

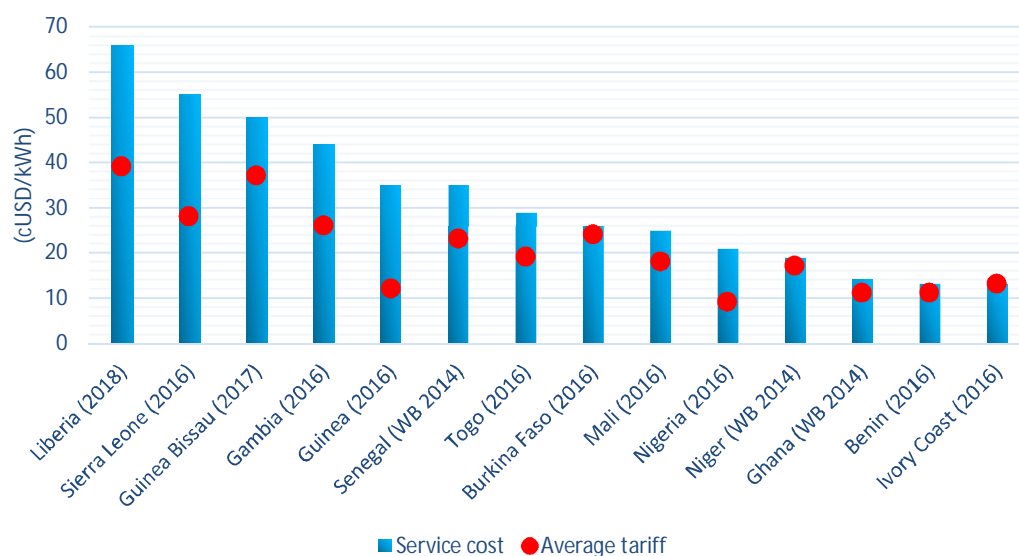


Figure 10: Costs of service and tariffs

The realization of this chart required to carry out conversions of currencies whose rates are given at the beginning of the report.

When data were not available as a result of data collection for this project, they were identified by "WB" attached to the country and were taken from the World Bank document: Financial Viability of Electricity Sectors in Sub-Saharan Africa - Quasi-Fiscal Deficits and Hidden Costs, World Bank Group, 2016.

The figure clearly indicates that tariffs applied in different countries do not cover the costs of electricity service. Some countries like Burkina Faso, Niger or Côte d'Ivoire are approaching it however.

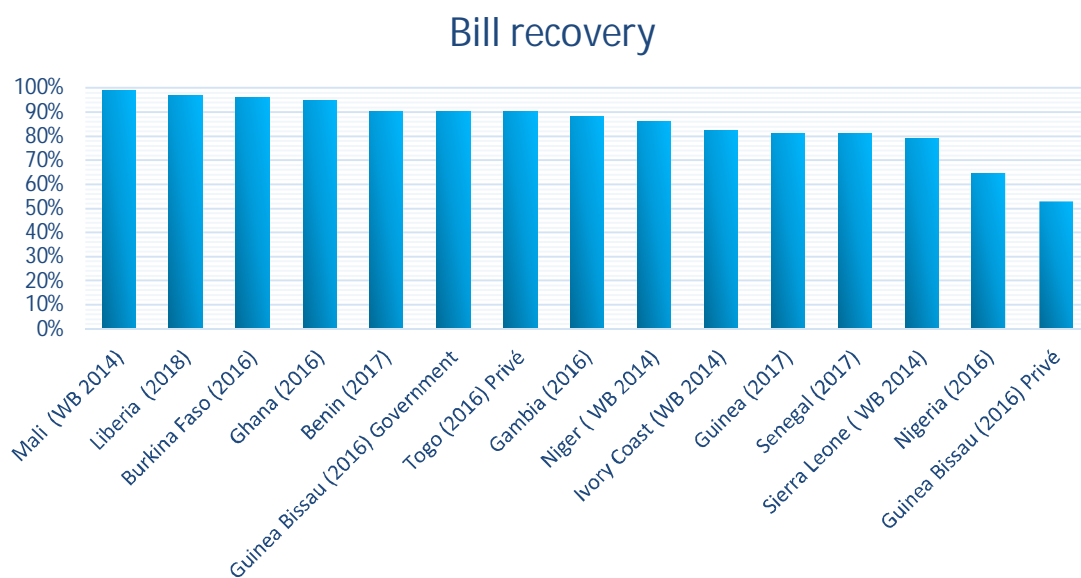


Figure 11: Bill collection rate

The bill collection rate contributes to the financial balance of the sector. The majority of countries find their collection rate at a relatively good level between 80% and 96%.

2.4.2. Financial health

The presentation of the financial health of the sector focuses on accounting and financial indicators such as: turnover and net income. They testify to the financial strength of society and the sector more generally.

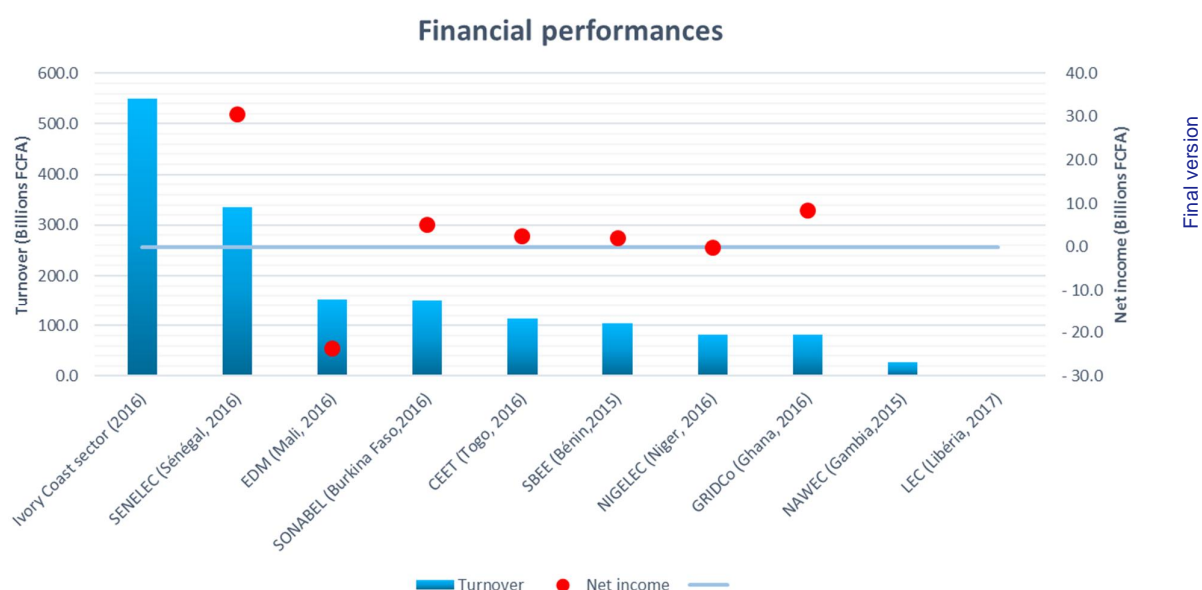


Figure 12: Financial results of Utilities

The turnover of the electricity sector shows significant differences from one country to another ranging from a few billion CFAF for Liberia to more than 500 billion CFAF for Côte d'Ivoire.

On the other hand, the net result indicates in some cases the difficulties encountered by the Utilities. This seems to be the case for EDM in Mali and, to a lesser extent, NIGELEC in Niger. SENELEC in Senegal, on the other hand, is showing significant profits.

2.5. Integration of new renewables into the energy mix

The integration of new renewables into the energy mix of WAPP countries is becoming a hot topic. As a reminder, the WAPP Master Plan approved in 2012 recommended the implementation of 800 MW of regional renewable energy projects in the WAPP area interconnected grid, corresponding to 500 MW of wind energy and 300 MW of solar energy.

Commitments and development plans

WAPP member countries pledged at the 2015 Paris Climate Conference (COP 21) to significantly reduce their greenhouse gas emissions by 2030 compared to anticipated emissions. This commitment is reflected in the electricity sector by increasing the share of renewable energy in the energy mix to reach a significant share in 2030. In line with these commitments, the diversification of the energy mix has become a priority.

The analyzes of the various countries show the implementation of renewable energy development plans and favorable directives:

- The objective of the 2030 electricity mix for the Ivory Coast taken during the COP 21 is to increase the share of renewable energy with large hydropower to 42% and to 16% excluding large hydropower.
- The Gambia plans to have a share of renewable energy representing 10% of the total energy produced by 2020.
- Ghana has put in place a specific network code for renewable energies and commissioned photovoltaic plants.
- Nigeria, through its 2015 National Renewable Energy and Energy Efficiency Policy, aims to increase electricity consumption from renewables to 16% by 2030.
- Senegal, in its energy policy, says that it will satisfy 20% of its energy consumption thanks to solar energy.

In addition, development finance institutions (DFIs) help finance these projects and include these projects in their roadmaps.

Renewable capacity installed

Today the installed capacity of new renewable energies remains marginal but shows a strong growth. Some countries have already integrated them into their energy mix:

- In Senegal, solar PV plants reach a power of 102 MW
- In Burkina Faso, the Zagtoui solar power plant has a capacity of 33 MWp
- In Ghana, 2.5 MW has been installed and several other projects are under development.

3. MAIN CHALLENGES AND CRITICAL FACTORS IDENTIFIED IN WAPP MEMBER COUNTRIES

The following are the main challenges and critical factors identified across WAPP member countries. These challenges and critical factors stem from the interviews and analyzes conducted on the electricity sector for the different countries. This presentation is thematic rather than country by country in order to facilitate reading. The themes are:

- Critical factors related to governance
- Critical factors related to planning
- Critical factors related to the development of large projects
- Critical factors related to operational efficiency
- Critical factors related to revenue collection
- Critical factors related to electricity as a commercial commodity

3.1. Critical factors related to governance

Critical factors related to governance are those pertaining to:

- Legal framework and governance framework of public companies and
- Operation code.

For a detailed description of the division of responsibilities of the various actors involved in the electricity sector, refer to the chapter on the Distribution of responsibilities of the electricity sector in each "country annex".

3.1.1. Sectoral governance often problematic

Most of the public utilities in the WAPP area have a Board of Directors whose appointment of directors varies from country to country.

However, as in the case of Guinea Bissau, the absence of a Board of Directors undermines the smooth running of the company, preventing it from planning and leading the recovery of its performance over the long term.

On the other hand, as the market evolves, the internal organization of companies must sometimes be readjusted. CI-Energies in Côte d'Ivoire or EDG in Guinea (as part of its management contract) have recently sought to reorganize themselves. On the other hand, NIGELEC in Niger remained frozen for many years without undergoing any evolution or reorganization. Today, this situation hinders the utility in its mission to develop the sector.

Sector governance is generally identified by stakeholders as a major constraint. Two main limits have been identified.

First, although power companies are theoretically responsible for the development of generation, transmission and distribution assets, companies are not always able to perform these functions. Indeed,

- limited financial space due to low tariffs and inefficiency of the system; as well as
- insufficient and inexperienced human resources in contractual negotiations

are lacking at the level of many companies in the electricity sector in West Africa.

In the absence of tangible results, the implementation of assets, especially strategic assets, regularly escapes the Utilities and is, in many cases, entrusted to a close committee of the executive and attached to the presidency of the republic.

In order to achieve the virtuous objective of developing the sector, structuring contracts are negotiated without involving electricity companies or with minimal involvement on their part.

Secondly, the decision-making power is very concentrated in the electricity companies in West Africa. This concentration is justified by the abilities, skills and cultures of companies. However, this situation slows the development processes down making the organizations inefficient. Indeed, each decision must be validated at a high level of the company and therefore takes a significant time.

3.1.2. Areas of responsibilities sometimes unclear

The functioning code of the electricity sector refers to the designation of the actors involved in the sector and their responsibilities. The diagnosis conducted in this study revealed, in some cases, a lack of clarity regarding this functioning code. Two examples are given:

- In Ghana, two regulators (PURC and Energy Commission) are likely to cover the same responsibilities and their respective roles can hardly be discernible. For example, there appears to be confusion over the monitoring of contracts because of overlapping missions.
- In Nigeria, the multitude of actors involved in the electricity sector leads to bureaucratic delays and difficulties. It appears that a multitude of actors are to be consulted in the context of the steps to be taken for the development of new projects.

On the other hand, the tariff setting function is frequently separated from the regulator as in Burkina Faso. This implies tariffs that do not reflect an economic coherence of the sector.

Finally, the dispute resolution function seems to be rarely assigned in the organization of the electricity sector in most of the countries studied.

3.2. Critical factors related to planning

Critical factors related to planning are those pertaining to:

- Development of generation capacities
- Development of the transmission and distribution network
- Cross-border trade (imports and exports)
- Choice of the energy mix

Planning is intended to be a response to the long-term needs of the economy in line with the resources needed to meet them.

In almost all the countries studied, planning takes the form of frequently updated master plans.

3.2.1. Supply-demand deficit compensated with expensive emergency solutions

The supply of electricity is systematically lagging behind the demand generating frequent and prolonged power cuts. In many countries of the region, the problem of the quality of food is addressed by emergency measures which prove to be very expensive. As emergency management continues, according to industry players, it can be as expensive as the cost of building a properly planned adequate asset.

Thus, the production deficit of some countries combined with a desire for rapid economic development in some cases leads to the use of emergency solutions. These are based on:

- the supply of the fuel by the State or the / a public company and
- the payment of the available capacity
- payment of the costs of installation and dismantling of the leased assets

3.2.2. Transmission lines under development

In order to be able to offer electricity to the end user, it is necessary to increase the electricity generation capacity and that of its transmission from the production center to the consumption center.

In parallel with the development of production capacities, the development of transport networks thus appears as a central point.

The development of the transmission network has been presented as a way to guarantee the stability of the network, particularly through the N-1 rule. On the other hand, the development of the transport network contributed to the attraction of the private sector in the production component. The development of the transport network is therefore a critical factor insofar as it guarantees private investors:

- the evacuation of the electrical energy produced to end customers or
- the export of electricity produced to neighboring countries through interconnections.

However, the diagnosis shows that:

- Despite numerous investments commissioned and underway, the transmission system remains a weak link in the supply chain. Indeed, few countries in the region where the transport network offers an adequate network of the country. Moreover, the lines are often dimensioned to the fair and do not always respect the criterion N-1.
- The insufficiency of the networks generates an additional investment cost for each new production project, since it is necessary, in addition to building the power station and connecting it, to extend the transmission network and reinforce it.

3.2.3. Distribution networks undermaintained and relatively limited

Reinforcement of the distribution network is also a critical factor, but for reasons more specific to its function of connecting end customers.

In urban areas: poorly maintained networks

Several end-users' testimonies revealed that *power quality defects often found their source in a defect in the source posts*. Thus, in many countries, in the absence of resources dedicated to the maintenance and rehabilitation of existing distribution networks, these networks have not adapted to urban growth. A post initially sized for a certain number of subscribers currently supplies twice as many subscribers or more thus generating a degradation of the power quality.

In addition, the lack of development of the distribution networks generates a bottleneck that does not allow the evacuation of the generation capacities put into service. Thus, in Nigeria, although the demand for electricity is increasing, there is untapped production capacity due to the limited capacity of the distribution networks.

In many countries of the zone, this problem is identified by the technical and financial partners and is the subject of corrective measures (example: Benin, Guinea, Nigeria, etc.)

In rural areas: limited networks

The distribution network plays directly on the rate of access of the population to electricity and consequently on the number of customers.

It has become clear in sparsely populated countries such as Niger and Mali that the development of the distribution network is constrained by the high connection cost per inhabitant in rural areas. The connection of these consumer profiles therefore involves significant efforts on the part of electricity companies.

3.2.4. Energy mix little diversified

The analysis of the electricity sector of the WAPP member countries revealed that some countries had a large share (over 60%) of their fleet based on a single technology (the energy mix of the countries is presented in Figure 6). This reliance on technology leads countries to expose themselves and to be relatively sensitive to exogenous effects such as climate hazards or fluctuations in the international market.

The main constraints identified for the different technologies are:

- Hydroelectric
 - Exposure to climate risk with dry years that do not produce the desired electrical energy;
- Fossil thermal
 - Strong exposure to fluctuations in fuel prices on the international market;
 - dependence on imports of fuels when resources are not naturally present in the country;

In the past, Ghana has had to cope with energy crises following a succession of dry years that failed to produce the amount of electrical energy it had planned from its hydroelectric assets.

3.3. Critical factors related to the development of large projects

Critical factors related to the development of major projects are those related to:

- Regulatory and institutional framework
- Mobilization of financing
- Contractual expertise

This category reflects all the difficulties that companies in the electricity sector face when developing decided projects.

3.3.1. Regulatory and institutional framework inadequate for the efficient participation of the private sector

The diagnosis of the different countries has shown that the lack of a regulatory and institutional framework is a major obstacle to the development of certain projects. This is particularly the case when developing large projects involving private actors through PPPs and IPPs.

3.3.2. Few sources of funding and small fiscal space

Mobilization of funding is an essential topic and has frequently emerged as the most critical in the development of major projects.

At present, the public debt capacity of the majority of WAPP member countries is limited. In addition, regional commercial banks are not always able to provide debt with maturity and rates suitable for the most capital-intensive and long-lived assets. The mobilization of these funds is therefore, most of the time, the result of the intervention of:

- Donors and development finance institutions (DFIs);
- The private sector through PPPs contractual and financial arrangements or the investment of IPPs
- Export credit agreements through import-export banks.

The capacity of Member States to mobilize these funds effectively can be greatly enhanced. It is often the case that:

- Projects submitted to donors are not adequately pre-prepared and credit files are often incomplete.
- Negotiations with private partners start without a roadmap and without prior preparation extending these negotiations

The mobilization of this funding is therefore often long and may have led to delays in the development of priority projects. For more details on the impact of the mobilization of financing in the development of priority projects, refer to the Diagnosis report of the implementation of the current Master Plan covering the period 2012-2025.

3.3.3. Weak financial health of utilities

"We do not know what a bankable electricity company looks like in West Africa" is a mantra repeated several times at the conference on regional cooperation in the electricity sector in West Africa (24-25 January 2018 in Abidjan)

It is important to note the importance that investors (potential sellers of electricity and creditors) give to the financial health of the electricity sector.

Several difficulties have been noted:

Unavailability of financial information of companies

The availability of the financial statements of public electricity companies and their audited accounts is a guarantee for these investors.

It is by relying on this factual information – whether good or difficult – that investors conduct their arbitrage on their investments. The non-existence of some of these documents has been identified as a strong constraint to the attraction of private actors in the market.

Large gap between costs and revenues

These differences are of great concern to debt and equity investors and push most of them to call for mechanisms to secure PPP payments or debt repayments. These mechanisms include the setting up of escrow accounts, the issuance of letters of guarantee and sovereign guarantees. All these mechanisms being expensive, member countries resort to them sparingly.

3.3.4. Award of contracts by direct agreement, fast but expensive

For the simplicity and rapidity of the process, some projects have been developed by direct agreement. This is particularly the case when developing emergency measures to be implemented in relatively short time. However, it has been noted that the cost of projects is often higher for direct agreements than for competitive bidding. The counterpart lies indeed in extended deadlines.

Today, certain contracts concluded in direct agreement are being renegotiated in order to reduce their cost, such as the "Take or Pay" contracts concluded in Ghana following the energy crisis of 2014.

3.3.5. Capacity for contract arrangement and contract management to build

Contractual expertise in the development of large projects has emerged as an essential requirement.

The very characteristic of "big projects" and the complexification of the market leads to more needs for contractual expertise not systematically present in the electricity companies. The contracts to be drafted and negotiated in this context are:

- construction contracts,
- operation and maintenance contracts (O & M),
- concession contracts (if any),
- power purchase agreements (PPA),
- credit agreements (if any) ...

The electricity companies point out that they do not always have the necessary expertise on these types of contracts.

Some countries that have opted to simultaneously diversify their energy mix and open the market to the private sector are finding it difficult to manage these new contracts.

The development of contracts for the development of renewable projects such as solar PV in Burkina Faso is an example among others. The drafting and negotiation of certain specific clauses relating to their operation require special skills. The shortage of human resources trained on these skills has led to delays in the development of these types of projects.

On the other hand, the opening of the market to the private sector is accompanied by the drafting, negotiation and management of specific contracts such as concession contracts. Some countries, such as Côte d'Ivoire, have noted a lack of internal availability of skills, which is still causing delays in project development.

3.3.6. Difficult access to land

Finally, the diagnosis revealed difficulties in the development of certain priority projects with a significant share of land. Hydroelectric projects, PV solar particularly involve issues concerning rights of access to land and building permits.

These issues include the development of social and environmental studies that have also been reported as time-consuming. In reality, the deadlines for carrying out these studies are not greater than elsewhere, however, taking these delays into account does not always seem to be respected in the initial schedules.

3.4. Critical factors related to operational efficiency

Critical factors related to the operational efficiency of the sector are:

- Network management systems to be strengthened
- Sub-optimal asset maintenance
- Constraints to the integration of new renewable energies

Operational efficiency has an impact on the quality of the supply. This usually refers to the quality of the frequency, voltage and interruptions experienced by consumers on the public network.

The consequences of a poor quality of food are materialized by a recourse to self-consumption by the larger accounts. The consequence highlighted by the actors in the sector is a deterioration of the quality of the client portfolio for the public company or concessionaire and a more expensive electric power supply for the consumer.

3.4.1. Network management to strengthen

The conduct of the networks faces many difficulties:

- Weakness of network codes
- Absence or weakness of the rotating reserve
- Manual Dispatching of electricity

These weaknesses result in frequent and long interruptions since the re-energization must be done manually.

The integration of intermittent renewables could lead to a weakening of the power quality if this limiting factor is not properly considered.

Directly related to the integration of new renewable energies and relating to the development of an interconnected network at the regional level, the issue of dispatching has become paramount.

Even though regional dispatching centers are being built, many countries in the zone display a lack of effective dispatching at the national level.

3.4.2. Suboptimal maintenance of assets

The maintenance of generation, transmission and distribution assets requires operational, procedural and financial responsiveness:

- operators knowing how to diagnose a problem,
- available funding to address the issue and
- Procurement procedures that allow for timely completion.

It is rare that these conditions be all realized.

The directly observed consequences of a lack of maintenance are:

- deterioration and early wear of equipment,
- significant technical losses,
- increased specific consumption,
- low availability of installed capacity (production and transport).

To this can be added interruptions and load shedding leading to the use of backup generators or self-consumption. In some countries, such as Togo, more than half of manufacturers use alternative supply solutions.

3.4.3. Technical constraints to the integration of new renewable energy

Technical constraints

The new renewable energies imply a fine technical management of their integration. The issue of the significant integration of PV solar power plants on the grid has raised two issues affecting the stability of the grid frequency:

- lack of inertia and
- the absence of a primary regulatory mechanism.

Countries wishing to develop the share of new renewable energies in their mix (Senegal, Ghana and Burkina Faso in particular) have had to take into account constraints such as the compensation of their intermittency via the constitution of an adequate revolving reserve. In the case of solar PV for example, the peak of production (midday) is not synchronous with the peak consumption (end of the day).

The main difficulty of some countries when developing solar PV projects was the lack of a Network Code. This Code makes it possible to specify the connection conditions and other conditions related to the technical integration of the ENRs. In 2016 this Code did not exist for Burkina Faso or Mali while these two countries are serious contenders for a large-scale development of solar PV.

Skills needs

The integration of new renewable energies and the development of interconnected networks at the regional level are accompanied by a need for new specific skills.

As for the management of new contracts, new technical skills appear to be critical in the development of these new technologies. The diagnosis revealed skills needs in:

- Stability of networks: frequency, voltage, ...
- Dispatching

3.5. Critical factors related to revenue collection

Critical factors related to revenue collection are:

- Knowledge of costs to improve
- Tariffs not reflecting the actual costs of the sector
- Consumption of end customers poorly apprehended
- A chain of recovery of invoices to improve

The financial equilibrium of the electricity sector depends on the adequacy of costs and tariffs charged to consumers. The imbalance between the costs and the applied tariffs was underlined collegially by all the electricity companies met; that they also linked to their financial difficulties.

3.5.1. Knowledge of the costs to be improved

The diagnosis highlighted that some countries like Liberia and Niger do not have access to the cost of their electricity service. This does not allow the sector to have a clear vision of its activities. When the cost price and, a fortiori, the costs of production and transmission of electricity are not known, the development of appropriate pricing cannot be conducted.

On the other hand, an accounting separation of the various activities (production, transport and distribution) of the companies was not automatically carried out, making it difficult to evaluate the costs generated by these different activities. More rarely, with the example of Guinea Bissau, where the company operates in several sectors (electricity, water and sanitation), the lack of analytical accounting leads to difficulties in identifying the revenue received by each of its services.

Technical losses and bill collection losses represent most of utilities' quasi-fiscal deficits in half of African countries.

Outside of South Africa, technical losses in transmission and distribution are the second largest quasi-fiscal deficits in 19 African countries, followed by losses from bill collection. The first component is underpricing. Utilities that experience significant losses in transmission and distribution also tend to experience losses in bill collection. Non-optimized management tends to lead to losses throughout the value chain.

3.5.2. Tariffs not reflecting the real costs of the sector

The observation has been made for all countries that the applied tariffs do not meet economic criteria and therefore do not allow to recover the costs borne by companies in the sector (refer to Figure 1 for the comparison of costs and rates). This chronic deficit has the effect of weakening the financial health of utilities.

Some countries have also not established a minimum period for re-evaluating these tariffs. The consequence is to force the country to tariffs that do not follow the evolution of the costs.

To remedy this phenomenon, as in Ghana, there are adjustment mechanisms that allow for exogenous effects such as the rise in fuel prices on the international market, for example. However, it was found that these mechanisms were only marginally used and only partially reflected the effects on costs.

A challenge related to rate increases was also selected from this analysis. The increase in tariffs for the supply of electricity is often disputed as it was the case in Côte d'Ivoire because it did not seem to be accompanied by an improvement of the quality of supply to justify it.

Finally, when subsidies are provided to compensate for the deficit of tariff levels, they are not always followed in a rigorous manner and the sector's debt is affected.

3.5.3. Consumption of end customers poorly apprehended

A critical factor greatly affecting the sustainability of utility services is the close counting of electricity with end customers. This difficulty appears in two forms:

- Fraud detection
- The estimate of consumption

Fraud, materialized by non-technical (or commercial) losses, is a real shortfall for the electricity companies. These frauds are however difficult to detect and sometimes lead to the establishment of important means such as "police" or "brigades" as in The Gambia. Even though they may be a relatively large part of business turnover, their struggle remains a difficult subject to deal with.

The estimation of consumption has also emerged as a major subject of this diagnosis especially when customers are billed. For many countries, the gap between estimated consumption and actual consumption has reached significant levels. It is then the planning of the request that is affected.

3.5.4. Chain of revenue collection to improve

In some cases, the collection of invoices reaches relatively low levels as in Nigeria. The low collection rate of bills leads to lower tariff revenues and directly affects the financial health of companies and the sector more generally.

As a result, electricity companies responsible for distribution and commercial activity are struggling to pay their suppliers. As the IPPs are paid in priority, they are mainly:

- public companies of national production and
 - foreign public companies exporting electrical energy
- who suffer, at the end of the chain, from this lack of recovery of bills.

The following example can be cited where:

- the bill collection from the public administrations of Togo is low,
- CEET suffers significant commercial losses,
- The CEB is not fully paid for the electricity it supplies to CEET,
- VRA claims a debt to the CEB for the energy it has made available on its network.

When the study of the sources of receivables is detailed for all countries, it appears relatively frequently that the lowest payers are at the level of administrative authorities and public authorities.

3.6. Critical factors related to electricity as a commercial commodity

Critical factors related to commercial activity are:

- Commercial basis of cross-border exchanges of electricity to be strengthened
- Absence of customer service

It is through the rigorous identification of customers and their real needs that the distribution of electricity manages to become sustainable.

3.6.1. Commercial basis of cross-border exchanges of electricity to be strengthened

The integration of the electricity sectors of West African countries is a major economic issue, which will eventually lead to a diversified and robust regional electricity mix at a lower cost. This issue to be supported by the WAPP.

The main electricity exchanges at the borders are done or will be done through the interconnections of the OMVG, the OMVS, the CLSG, Ghana-Burkina Faso, Guinea-Mali. The exchange of natural gas at the borders passes through the West African Gas Pipeline.

Feedbacks on the management of infrastructures in service is that the system is based on political and "fraternal" relations and not on a solid commercial relationship:

- The negotiations of these exchanges were historically held at a high political level and outside of any coordinated technical framework
- Exporters export their surplus and, when there is no surplus due to occasional droughts or a lack of planning and investment for example, the delivery to the importer may be disrupted
- Importers are not always good payers

The weakness of the commercial framework of these exchanges generates:

- Unreliable imports and exports. Whether electric power or fuel supply, this reliability is essential for highly importing countries such as Togo and Benin (through the CEB), Niger or The Gambia.
- Unanticipated financial gaps, since they were not well expected at the trading negotiation step. For example, exchange rate risk is not always included in import / export contracts.

3.6.2. Absence of customer service

Customer service may appear as a critical factor in this context. The absence of customer services in some cases, such as in Liberia, leads to the loss of potentially connectable customers who:

- Either fail to express their wish to be connected while they are ready to put the means to,
- Either fail to get information on the progress of their connection process.

This lack of customer service sometimes leads potential customers to resort to clandestine connection solutions.

3.7. Summary of the main critical factors identified







Topics	Critical factors
 Governance	<ul style="list-style-type: none"> • 1. Sectoral governance often problematic • 2. Areas of responsibilities sometimes unclear
 Planning	<ul style="list-style-type: none"> • 3. Supply-demand deficit compensated with expensive emergency solutions • 4. Transmission lines under development • 5. Distribution networks undermaintained and relatively limited • 6. Energy mix little diversified
 Development of large projects	<ul style="list-style-type: none"> • 7. Regulatory and institutional framework inadequate for the efficient participation of the private sector • 8. Few sources of funding and small fiscal space • 9. Weak financial health of utilities • 10. Award of contracts by direct agreement, fast but expensive • 11. Capacity for contract arrangement and contract management to build • 12. Difficult access to land
 Operational efficiency	<ul style="list-style-type: none"> • 13. Network management to strengthen • 14. Suboptimal maintenance of assets • 15. Technical constraints to the integration of new renewable energy
 Revenue collection	<ul style="list-style-type: none"> • 16. Knowledge of costs to improve • 17. Tariffs not reflecting the real costs of the sector • 18. Consumption of end customers poorly apprehended • 19. Chain of revenue collection to improve
 Electricity as a commercial commodity	<ul style="list-style-type: none"> • 20. Commercial basis of cross-border exchanges of electricity to be strengthened • 21. Absence of customer service

Figure 13: Synthesis of the critical factors identified

4. CLASSIFICATION AND PRIORITIZATION OF CRITICAL FACTORS

The second phase of this study, after identifying critical factors, is to classify and prioritize these critical factors.

4.1. Cartactization and classification of critical factors

4.1.1. Cartactization of critical factors

As mentioned in the introduction, a characterization of the critical factors is carried out in order to classify them. The characterization is done according to three axes considered as variables recalled below:

Impacting

The impact of the critical factor corresponds to the impact of the critical factor considered on the efficiency, performance and sustainability of the services of the utilities. It is assessed here to what extent the critical factor is detrimental to utility in its proper functioning.

Transversal

Even though some of these challenges and critical factors appear to be country-specific with respect to the historical, cultural, political or economic context, others are repeated from one country to another in the sub-region. These critical factors will then be considered transversal.

Addressable

A critical factor will be considered in this study as addressable from the point where measures and actions can be envisaged and carried out by the considered utilities. Thus, the critical factors related to the governance, sectoral organization and regulation and the regulatory and institutional framework are not directly addressable by the utilities but, nevertheless, remain of high importance for the sectoral strategy. In addition, for the critical factor to be considered addressable, it is understood that the actions or actions can be conducted in a reasonable time and manner.

It is important to remind that these variables are completely independent of each other. A critical factor can answer one, two or three criteria in a completely independent way.

4.1.2. Classification of critical factors

The ranking of the critical factors according to these three variables is therefore given below:

Topic	Critical factor	Impacting	Cross-cutting	Adressable
Governance	Sectoral governance often problematic	X		
	Areas of responsibilities sometimes unclear	X		
Planning	Supply-demand deficit compensated with expensive emergency solutions	X	X	X
	Transmission lines under development	X	X	X
	Distribution networks undermaintained and relatively limited	X	X	X
	Energy mix little diversified		X	X
Development of large projects	Regulatory and institutional framework inadequate for the efficient participation of the private sector	X		
	Few sources of funding and small fiscal space	X	X	
	Weak financial health of utilities	X	X	X
	Award of contracts by direct agreement, fast but expensive	X	X	X
	Capacity for contract arrangement and contract management to build	X	X	X
	Difficult access to land		X	X
Operational efficiency	Network management to strengthen		X	X
	Suboptimal maintenance of assets	X	X	X
	Technical constraints to the integration of new renewable energy		X	X
Revenue collection	Knowledge of costs to improve			X
	Tariffs not reflecting the real costs of the sector	X	X	

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Topic	Critical factor	Impacting	Cross-cutting	Adressable
Electricity as a commercial commodity	Consumption of end customers poorly apprehended	X	X	X
	Chain of revenue collection to improve	X	X	X
	Commercial basis of cross-border exchanges of electricity to be strengthened	X	X	X
	Absence of customer service			X

Table 5: Classification of critical factors

4.2. Prioritization of critical factors

Thanks to the classification of the critical factors a prioritization can be realized. This prioritization makes it possible to distribute the critical factors according to their degree of importance. This prioritization will finally provide a guiding line for the next phase of developing a plan of actions and actions to mitigate these critical factors.

4.2.1. Definition of the priorities selected

The prioritization of critical factors is carried out on a scale based on three levels of importance:

Priority 1

Priority 1 corresponds to the critical factors that met the three criteria: impact, transversal and addressable.

Priority 2

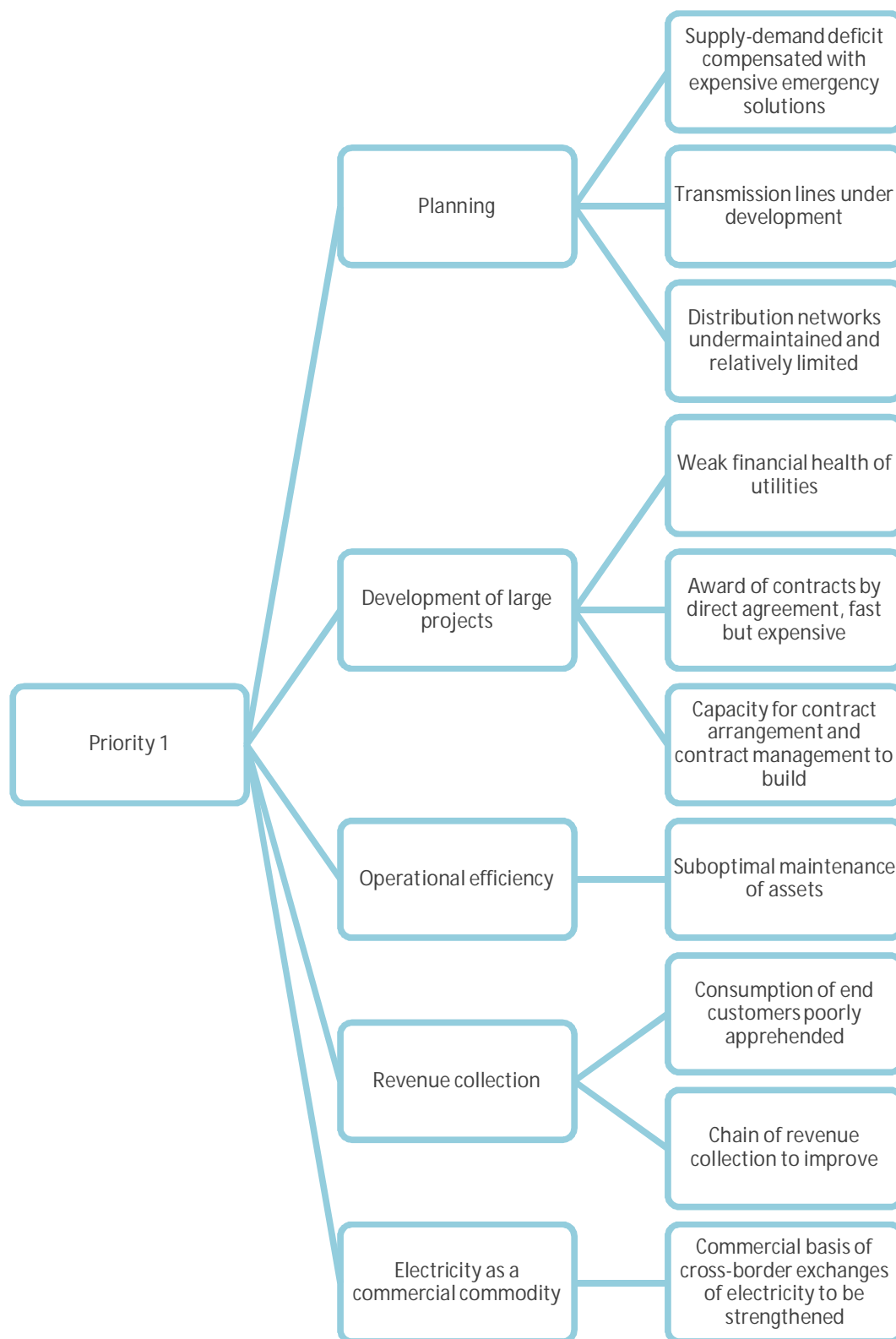
Priority 2 corresponds to critical factors that met two of the three criteria AND necessarily the addressable criterion. In this case, it is a question of transverse and addressable critical factors because no critical impacting and addressable factor without being transverse has been identified.

Transverse and addressable: In this case the critical factor does not seem to generate a significant impact so that it is considered of primary importance.

Priority 3

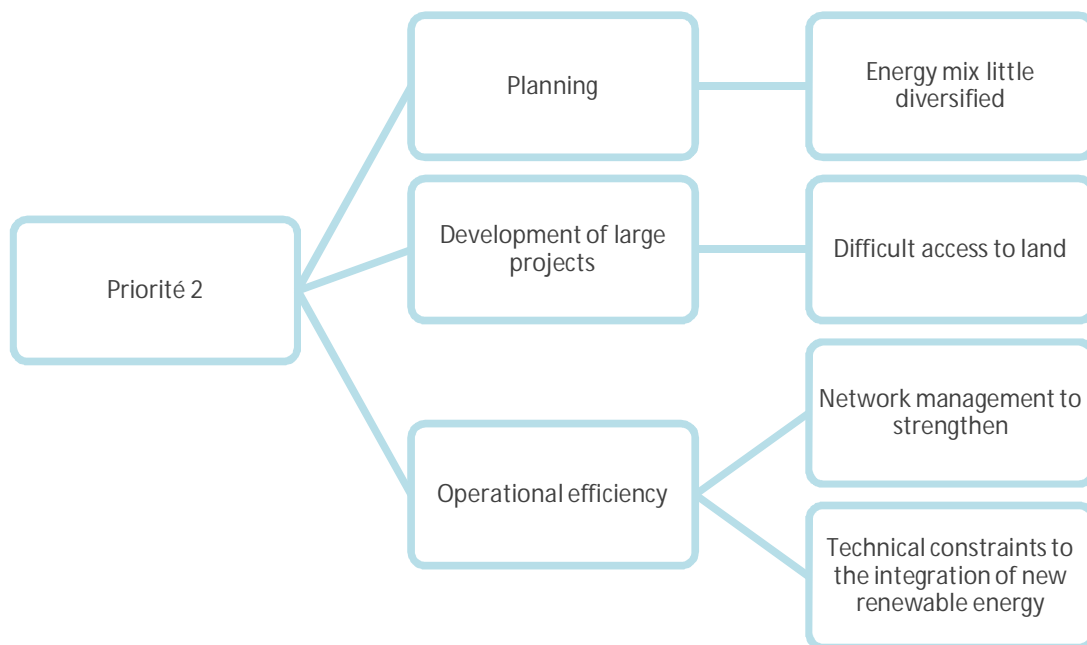
Priority 3 represents the other critical factors.

4.2.2. Priority 1

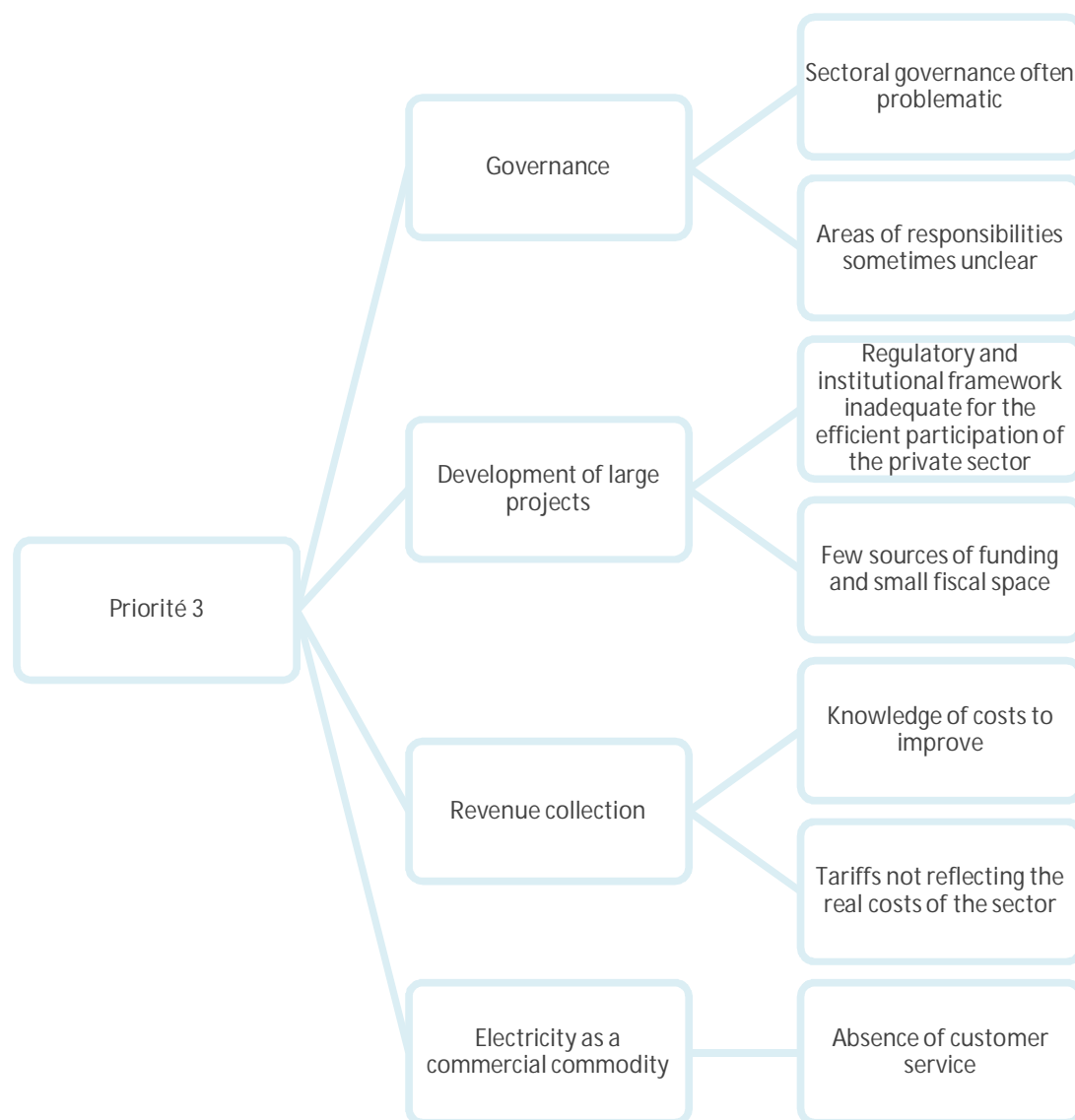


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4.2.3. Priority 2



4.2.4. Priority 3



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The critical factors indicated by (*) correspond to the critical factors that can not be addressed by the utilities but in direct relation to the sector strategy. They refer to issues of governance, sectoral organization and regulation and the regulatory and institutional framework.

5. ANALYSIS OF THE CURRENT MEASURES AND ACTIONS

5.1. Strategies underway and planned by WAPP member utilities

For some of the critical factors identified, measures and actions have already been undertaken by WAPP member utilities. These solutions are presented below:

- The introduction of standardized electricity import and export contracts between the different countries of the zone is envisaged within the framework of a regional market at the initiative of the WAPP.
® This action makes it possible to take into account the best practices in the drafting and negotiation of this type of contract.
- Establishment of technical and legal support from Development Finance Institutions (DFIs).
® This action will improve the drafting and negotiation of the various contracts in the context of the development of projects involving the private sector or for new technologies.
- Establishment of the Information and Coordination Center (ICC) at the initiative of WAPP.
® This action allows the coordination of the operation of electrical systems at the different national dispatching centers, which is essential for regional integration of the electricity sectors, as well as the management of the WAPP electricity market.
- Implementation of management contracts
® Thanks to experience feedback from management contracts conducted in the past in Guinea and Liberia, for example, good practices could be integrated into the followings.
- Set up of prepaid meters
® Prepaid meters, to some extent, increase the rate of bill collection for the utilities and for customers to better manage their electricity consumption. Lessons learned on their effectiveness can be studied in order to share them with other countries.
- The establishment of "Police" or "Brigade" frauds on the model of The Gambia
® The relevance and effectiveness of the implementation of a "Police" or "Brigade" frauds can be studied to replicate the model in other contexts to reduce the level of commercial losses.

5.2. International benchmark of transposable best practices

Achieving an international benchmark permits to identify actions and measures adopted in different contexts favoring the performance of the electrical sector at national and regional levels. After analysis, some of these measures appeared to be transposable to the West African context.

The examples presented below - since they appear to be the most relevant - are:

- The electricity sector in Ethiopia
- The electricity sector in Vietnam
- The Greater Mekong Subregion (GMS)
- The South African Power Pool (SAPP)

5.2.1. The electricity sector in Ethiopia

Ethiopia, a country located in the eastern part of the African continent, is part of the East African Electricity Power Pool (EAPP).

This country is characterized by a large share of hydropower in its energy mix and one of the largest growth demand in the world in recent years.

The following are some of the measures and actions taken in the electricity sector and their possible transpositions to the West African context.

5.2.1.1. CORPORATE GOVERNANCE

Challenges encountered	Actions made	Transposable recommendations
A structure not in line with the market	In 2013, the vertically integrated company EEP was split into two companies, one in charge of generation (EEP) and another responsible for electricity distribution (EED).	A reorganization of electricity utilities to better match the market

5.2.1.2. PLANNING

Challenges encountered	Actions made	Transposable recommendations
Transmission lines under development	Project: Line between Addis Ababa and the Western Region.	Extension and strengthening of networks and interconnections
Supply-demand deficit	Implementation of a "Grid Code" within the framework of the Power Africa program studying the supply-demand balance and the standardization of procedures.	Establish and apply a Grid Code allowing harmonization of master plans, strategic plans and roadmaps for the development of electricity generation and transmission

5.2.1.3. DEVELOPMENT OF LARGE PROJECTS

Challenges encountered	Actions made	Transposable recommendations
Few sources of funding and small fiscal space	<ul style="list-style-type: none"> Project: Ashegoda Wind Farm (120 MW) Multiple financing with guarantees: BNP Paribas with COFACE¹ guarantee Agence Française de Développement (AFD) Commercial Bank of Ethiopia 	Facilitate and encourage private financing through a portfolio of sovereign guarantees to lenders.
A non-efficient participation of the private sector and technical constraints to the integration of new renewable energy	Creation of a renewable energy unit within EEP, under the mandate of the Ministry of Finance, facilitating private sector participation.	Reorganization of utilities' structures to better match the market

5.2.1.4. OPERATIONAL EFFICIENCY

Challenges encountered	Actions made	Transposable recommendations
Technical constraints to the integration of new renewable energy	<p>Establishment of a new dispatch center.</p> <p>Technical assistance and training programs.</p>	<p>Technical support to be strengthened</p> <p>Development of a grid code facilitating the optimization of the energy system</p>
Network management to strengthen		

5.2.1.5. COMMERCIAL EFFICIENCY

Challenges encountered	Actions made	Transposable recommendations
Consumption of end customers poorly apprehended	Decentralization of collection management: Regional clusters with autonomous decision-making structures	Implementation of prepaid meters and decentralization of invoice and bill collection activities
Chain of revenue collection to improve		

5.2.2. The electricity sector in Vietnam

Vietnam, a country in Southeast Asia, has a relatively robust and mature electricity system compared to other countries in the sub-region.

¹ Compagnie Française d'Assurance pour le Commerce Extérieur

The following are some of the actions and measures undertaken as a result of targeted interviews and the Financial Recovery Plan for Vietnam Electricity (EVN)².

5.2.2.1. CORPORATE GOVERNANCE

Challenges encountered	Actions made	Transposable recommendations
A sectoral structure that is often problematic	Complete unbundling of operational activities and separation of revenues Disposal of non-core assets	Organic reorganization of utilities' structures Cost accounting and annual financial statements audits Empowerment of the autonomy and the competence of boards of directors
	Improved governance	

5.2.2.2. DEVELOPMENT OF LARGE PROJECTS

Challenges encountered	Actions made	Transposable recommendations
Regulatory and institutional framework inadequate for the efficient participation of the private sector	Encourage private sector participation by simplifying licensing, land access and contract standardization procedures	Enhancement of clearness in procurement procedures with the private sector
	Limit investment by public electricity generation companies (Genco) and adjust PPAs to encourage private investment by increasing their duration from 10 to 20 years	Public policies and regulatory framework facilitating private investments (guarantees on the remittance of funds, access to land, etc.) Standardization of contractual clauses in the PPAs

5.2.2.3. OPERATIONAL EFFICIENCY

Challenges encountered	Actions made	Transposable recommendations
Suboptimal maintenance of assets	Asset rehabilitation	Prioritize the rehabilitation of production and transportation assets

5.2.2.4. FINANCIAL HEALTH

Challenges encountered	Actions made	Transposable recommendations
Few sources of funding	Look for long-term funds directly from capital markets with sovereign guarantees to act as a catalyst.	Definition of a portfolio of sovereign guarantees

² Maweni, Bisbey. A Financial Recovery Plan for Vietnam Electricity (EVN) with implication for Vietnam's Power Sector. The World Bank. 2016.

Challenges encountered	Actions made	Transposable recommendations
Weak financial health of utilities	Creation of a fund to manage hydrological risk and the fuel price	Efforts to secure project budgets and anticipate preconditions Gather the conditions for the raising of bonds and the opening of capital to institutional funds

5.2.2.5. COMMERCIAL EFFICIENCY

Challenges encountered	Actions made	Transposable recommendations
Tariffs not reflecting the real costs of the sector	Adopt cost recovery pricing	Reinforcement of the regulator's role and its prerogatives on electricity tariff mechanisms Adoption of a cost recovery pricing, with price compensation if necessary

5.2.3. The Greater Mekong Subregion (GMS)

The evaluation of the Greater Mekong subregion practices is based on the reports published by the Asian Development Bank (ADB) concerning the following projects:

- Harmonization of electricity systems in the Greater Mekong Subregion facilitating regional electricity trade (2014)
- Integrated resource planning including an environmental assessment for the sustainable development of the energy sector in the Greater Mekong Subregion (2015)

5.2.3.1. PROGRAM AND OBJECTIVES

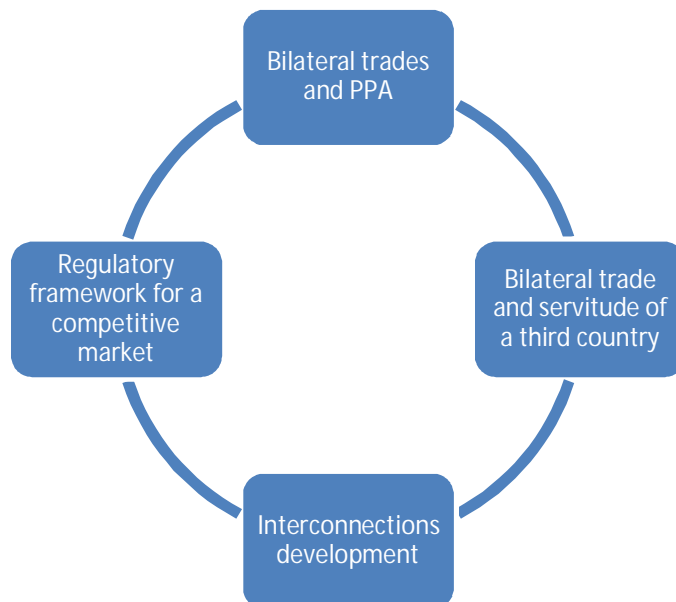
The program of the Greater Mekong Subregion (GMS) is organized in order to respond to rapid growth in the economies of the member countries. On the energy side, the GMS aims to meet a growing energy demand with a regional approach allowing the development of profitable generation and transmission projects while promoting a diversified energy mix.

The GMS has the following objectives:

- Harmonization of performance standards and Grid Codes stipulating technical rules for coordinated planning of the regional electricity market;
- The creation of the Regional Power Trade Coordinating Committee (RPTCC), launched in 2012 and currently composed of Cambodia, China, Laos, Burma, Thailand and Vietnam.
- Harmonization of the regulatory and legal framework and tariff standards for network access by third parties.

In particular, the GMS develops the RPTCC through the four axes below:

- Bilateral cross-border interconnections through Power Purchase Agreements (PPAs);
- Exchanges of electricity between any member country of the GMS, by exercising a right of easement on the transmission line of a third country of the region when the first two are not adjacent;
- The development of transmission lines dedicated to cross-border trade;
- The transition from a multi buyer-seller regulatory framework to the development of a fully competitive regional market.



5.2.3.2. TRANSPOSABLE ACTIONS AND RECOMMENDATIONS

Actions made	Transposable recommendations
Communication on the best practices on thermal assets efficiency improvement (gas and coal particularly)	Capitalization of the ICC
Adoption of performance indicators (at national and subregional levels)	Development of a grid code facilitating the optimization of the energy system
Création d'une feuille de route ayant pour objectif et finalité un marché concurrentiel	Harmonization of master plans, strategic plans and roadmaps

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5.2.4. The South African Power Pool (SAPP)

The South African Power Pool (SAPP) is emerging as the most advanced trading system in sub-Saharan Africa.

The following are some of the actions and measures taken from targeted interviews and the latest SAPP activity reports.

5.2.4.1. PLANNING

Actions made	Transposable recommendations
Discuss with Japan on best practices in terms of planning, design, operation and maintenance of the electrical system.	Technical and legal support to be strengthened by DFIs
Structuring of Zimbabwe - Zambia - Botswana - Namibia Interconnection Project (ZIZABONA). Project separated into 3 components to facilitate the funding securing.	Diversification of project implementation schemes
Phasing of the MOZISA transmission line project between Nzhelele (South Africa) and Triangle (Zimbabwe). The phasing was done in 2 components to reduce the risks and facilitate the rapid development.	

5.2.4.2. DEVELOPMENT OF LARGE PROJECTS

Actions made	Transposable recommendations
Development of the "Project Definition Readiness Assessments" (PDRA). The tool evaluates the project at the decision, design and execution stages.	Ensure efforts to secure project budgets and anticipate preconditions

5.2.4.3. OPERATIONAL EFFICIENCY

Actions made	Transposable recommendations
Implementation of the second phase of the fiber optic telecommunications network development project facilitating the transmission of data and voice communications.	Capitalization of the ICC and improve dispatching procedures
Development and implementation of 4 trading platforms: Long-term platform, Day-ahead fixing platform (2015), Long-term market platform at the end of the month and the week (2016), Intraday continuous platform (2016).	

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Actions made	Transposable recommendations
<p>The platform also assesses the energy imbalance and the losses.</p>	

6. MEASURES AND ACTIONS TO ADDRESS THE CRITICAL FACTORS

The following is a list of measures and actions to address the identified critical factors. The actions were identified through :

- Current and planned strategies by the governments and the utilities and,
- International benchmarking of best practices transposable to the West African context.

These actions are grouped thematically to respond to the categories of critical factors as follows:

- Actions related to governance
- Actions related to planning
- Actions related to the development of major projects
- Actions related to operational efficiency
- Actions related to the financial health of utilities
- Actions related to commercial efficiency
- Actions related to capacity building

6.1. Actions related to governance

6.1.1. Appropriate use of management contracts

Overview

Management contracts are contracts by which the public entity transfers part or all the management of its infrastructure to a private operator for generally between three to five years. The private operator replaces the public entity in the management of the company without changing its legal status or ownership.

The management contract is a type of PPP that makes possible to meet the difficulties encountered by the public electricity companies in the management procedures. These difficulties may concern:

- financial and accounting management of the company,
- contractual management with suppliers, customers and partners,
- organizational management of the company,
- commercial management,
- technical management of the assets owned by the company.

A utility company might be affected by one or some of these difficulties. However, it is common to use a management contract when the company experiences most of these challenges. Other solutions are considered when it comes to treat one or some of the difficulties mentioned above, especially through technical assistance services contracts.

An alternative with the performance contract

An alternative to management contracts is the establishment of a performance contract between the utility and the State generally for a period of three years. This contract establishes:

- the obligations and commitments of both parties,
- operational and financial performance improvement indicators and targets - which are linked to a three-year Corporate Plan, broken down into annual operational action plans,
- incentive mechanisms for performance and
- the audit disposals of the contract.

Such contracts are in progress in the WAPP countries in Senelec (Senegal) and CEET (Togo) and have been used in countries outside the WAPP such as Electra (Cape Verde), SNEL (DRC) and REGIDESO (Burundi).

Obligations of the management contract

The management contract leads to several obligations for both the manager and the owner that require a strong commitment from both parties:

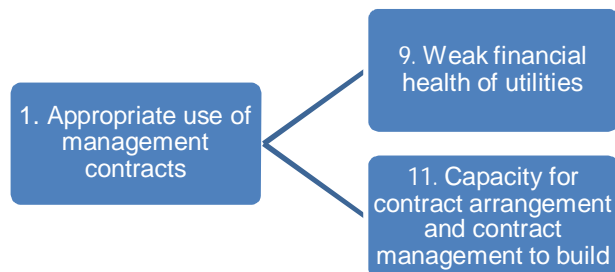
- The obligations of the manager are:
 - an obligation to manage to achieve performance goals,
 - an obligation to respect the statutes and regulations of the company and,
 - an obligation to report.
- The obligations of the owner are:
 - an obligation to make available the property to be managed,
 - an obligation to finance the management and,
 - an obligation of non-interference in the management of the manager.

The remuneration of the management contract is usually based on the services provided and also includes a part related to the performance of the private operator.

à Results from previous management contracts in Guinea and Liberia, for example, could serve as a support in the decision-making process for succeeding contracting cases. Similarly, good practices could be identified to be integrated into following management contracts as in the case of Guinea-Bissau in the near future.

Application

The main critical factors addressed by this action are:



6.1.2. Reinforcement of the regulator's role and its prerogatives on electricity tariff mechanisms

General information

The presence of an independent regulator appears to be necessary from the moment when the electricity market becomes relatively developed in terms of: tariff regulation, concession contracts development, independent production applications or the customers eligibility to contract directly with producers.

Its presence is further strengthened when the private sector announces its intention to penetrate the market.

The regulator then provides different guarantees and improves sectoral governance through:

- A watch for transparent and non-discriminatory access to public electricity transmission and distribution networks,
- The tariffs setting for the public electricity service,
- To control contracts concluded between the system operators,
- To arbitrate disputes over contracts concluded between operators in the sector (generation, transmission, distribution, eligible customers),
- To impose sanctions in case of breach of obligations by an operator or a user of an electricity infrastructure.

Pricing and economic balance of the sector

The regulator must ensure a responsibility to guarantee the economic equilibrium of the electricity sector through the electricity tariff setting and the remuneration of the service. The regulator, thanks to its independence, appears as the only one to be able to apply mechanisms of adjustment of the tariff of the electricity according to the endogenous as exogenous fluctuations having an impact on the cost of the electricity.

The regulator makes it possible to regularly re-evaluate the electricity tariff in such a way as to reflect the realities of the sector and avoid increasing the financial gap. Limited and frequent increases in tariffs are probably better accepted if the reliability of the electricity is guaranteed.

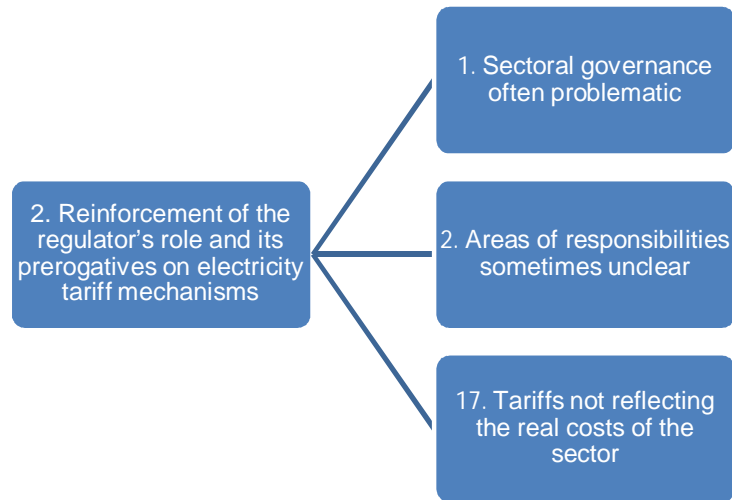
Sector Actors and Areas of Responsibility

The presence of the regulator is not always a decisive factor in attracting the private sector but helps to maintain a satisfactory balance between all stakeholders. Thus, the regulator tends to clarify the delimitation of the areas of responsibility of the actors of the sector (regulator, public electricity company, ministries of guardianship, ...).

à The establishment of a regulator, as soon as it appears relevant for reasons of maturity or ambition to liberalize the electricity sector, becomes a prerequisite for good management and balance of the sector. Therefore, it must be endowed with the means and responsibilities necessary to carry out its missions and in particular that concerning the pricing of electricity.

Application

The main critical factors addressed by this action are:



6.1.3. Reorganization of utilities' structures to better match the market

General information

Two kinds of reorganization of the utilities can be considered:

- From an integrated society, the separation of the different activities of the value chain into several utilities (disintegration or vertical separation), sometimes as subsidiaries of a holding company,
- The organic reorganization of a given society.

In either case, these reorganisations are carried out in such a way as to respond to new market constraints and the emergence of new electricity generation technologies, or to improve efficiency and transparency in each business segment.

Vertical separation of the utility

In the first case, it is a question of a separation of the different activities of the value chain of the electricity sector i.e. generation, transmission, distribution and commercialisation. This separation takes place in several utilities that are legally and accountably separated to each other.

When the market becomes mature enough and evolved this separation helps to promote competition and leads to the opening of the market to the private sector. As the areas of responsibility are better defined, the market appears to operators to be more transparent and favorable to the arrival of new actors.

Organic reorganization of the utility

In the second case, the organic reorganization of a given company (in particular in power generation companies) permits to better respond to new market challenges. To illustrate, some examples can be cited:

- Diversification of electricity generation and commercialization technologies

The necessary technical expertise differs according to the type of technology considered and, in particular, when it comes to new renewable energies. An organization by technology can then be relevant. In the same way, the generalization of prepaid meters requires a specific structure.

- Options for the development and project financing

Project financing and coordination with DFIs and possibly the Ministry of Finance can be complex and require a dedicated department.

- Customer service needs

The call for customer services is becoming increasingly strong across the different West African countries, whereas today it is often absent or relatively limited.

- Efficiency improvement requirements

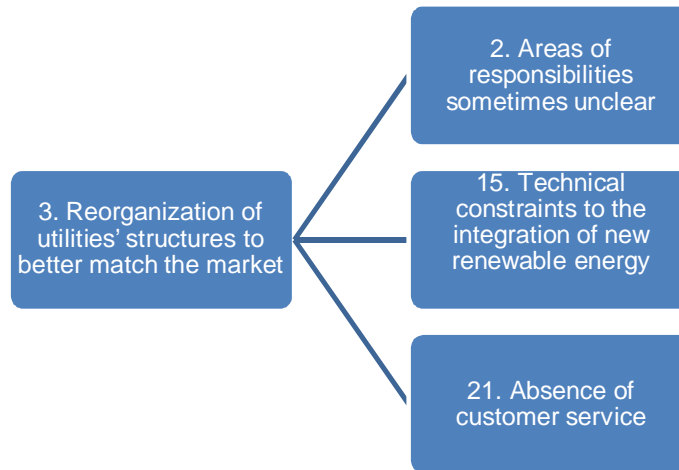
These requirements may respond to external pressures (supervisory or financial) or internal (board of directors) and require improvement of productivity, transparency and commercial orientation of the utilities.

Human resources and the needs for internal and external resources must be dimensioned to respond to these new organizations. An in-depth analysis of the company's environment must then be conducted. Such organic reorganization has recently been carried out within CI-ENERGIES as a basis for good practice that can be revalued for subsequent experiments.

➤ Power utilities must match the market and its paradigm shifts through a sectoral reorganization by splitting the value chain into several different legal entities when necessary and; by an organic reorganization favoring greater agility to respond to new market constraints and the requirements for improving efficiency.

Application

The main critical factors addressed by this action are:



6.2. Actions related to planning

6.2.1. Capitalization of the ICC and improve dispatching procedures

General information

The Information and Coordination Center (ICC) is the result of an initiative of the WAPP. The purpose of this action is to promote the sharing of information to stakeholders and assistance to utilities for the operation of the interconnected system. In particular, the Center will be able to coordinate at the level of the various national dispatching centers essential to regional integration of the electricity sector.

Dispatching issues

The priority projects can respond to their regional vocation only through the establishment of an electricity dispatching which is ensured both at national and regional level. Regional coordination is therefore essential for pooling and optimizing resources in the electricity sector.

Beyond the bi and multi lateral contracts between the states concerning the electricity exchange, the optimization of the resources and the system reliability will be made possible through:

- The spinning reserve management in order to secure the electricity reserve,
- a faithful knowledge of the costs in order to base the supranational dispatching on economic considerations and,
- the sharing of information through the centralization of data allowing, for example, to verify the technical capabilities of power plants to assess their contribution to the ancillary services.

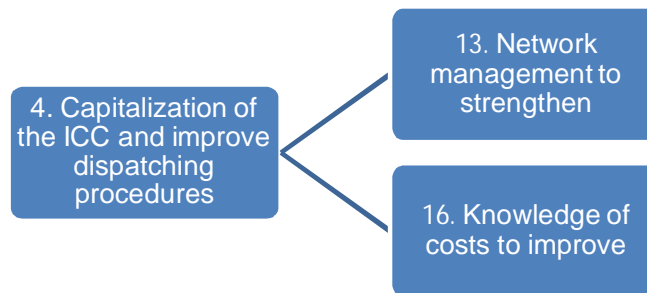
These elements of management, knowledge and information sharing will be made possible and strongly promoted through the implementation of the ICC.

One manner to ensure a successful and beneficial integration of renewable energies with a regional vocation is the establishment of an ancillary services market. It would be first a market for power producers to participate at the frequency, voltage and reactive energy regulation. The implementation of such market must be part of the WAPP's prerogatives and must be included in its roadmap. This market, in its operation, can be based on the work of the ICC through its target for system optimization.

à The enhancement of the ICC will be an essential link to the valorization of regional priority projects as well as to the transition to a regional electricity market within the WAPP.

Application

The main critical factors addressed by this action are:



6.2.2. Harmonization of master plans, strategic plans and roadmaps

General information

National master plans are usually written in coherence with national strategies and in line with countries' resources and their energy objectives. These are designed through the analysis of the different electricity value chain development options of each country.

This Regional Master Plan provides a vision for integrated development of the regional generation and transmission sectors. The axes proposed by this master plan are not systematically integrated at the level of the national master plans of the different countries.

Areas for improvement

A first improvement towards the establishment of an integrated regional market would be to ensure consistency between regional and national master plans. This action could involve consultation or participation of the WAPP Secretariat in the process of developing the different national master plans. He would be in charge of verifying the compliance of the national master plans with the regional one as well as with the ECOWAS Renewable Energy Policy (EREP) of the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE).

A guarantee of reliability of the chosen scenario is due to the frequent updating of the demand projections. These updates are based on the evolution of macroeconomic factors updated according to events occurring both at the country level and in the international markets.

The resilience of the system stems from the diversification of resources and technologies of electricity generation. The development of new intermittent renewables assets should be strongly considered in future master plans and roadmaps, as well as cross-border electricity import and export. Studies must be conducted concerning:

- Renewable energies technical integration (network stability, connection constraints, etc.)
- Economic dispatching through the generation park merit order.

These studies can be conducted under the supervision of national agencies dedicated to renewable energies.

The development of these technologies is also part of the agendas of DFIs and major investors in the sector. National electricity companies can then work in close cooperation with renewable energy agencies to respond to these new issues.

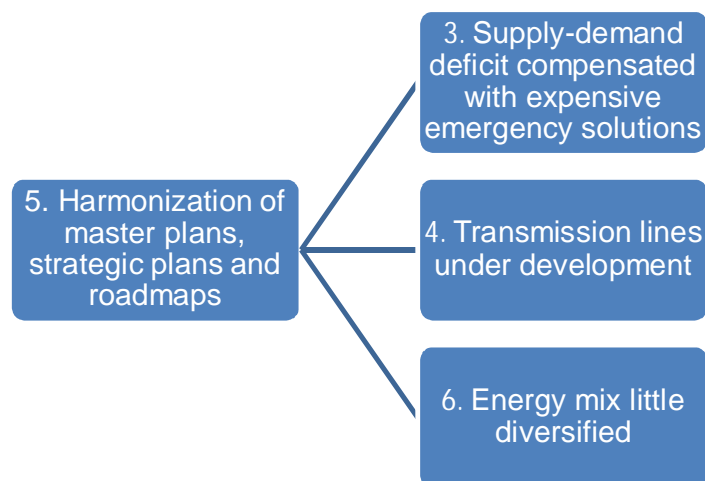
à The situation of the improvement axes mentioned above, namely:

- Harmonization of master plans at different scales,
- A frequent assessment of the electricity demand and
- Diversification of generation assets

are the ingredients on the one hand to avoid using polluting and costly emergency solutions (i.e. diesel rental facilities) and, on the other hand, to move towards a regional organization of the electricity market.

Application

The main critical factors addressed by this action are:



6.2.3. Extension and strengthening of networks and interconnections as a determinant of the system's performance

General information

All West African countries deplore technical and non-technical losses on transmission and distribution networks exceeding 20% of the production. Although a large share is due to non-technical / commercial losses (this subject will be dealt with later in the section dedicated to the commercial efficiency), a part remains the consequence of:

- The deterioration and the obsolescence of the transmission and distribution networks and substations,
- Overloading of transmission and distribution networks.

In addition, the N-1 rule is relatively unimplemented in the West African region.

The national network

The densification and reinforcement of the electricity network must include the modernization of the network among others in order to allow the integration of the new intermittent renewable energies.

The extension of the networks could allow the improvement of the rate of electrification as well as the rate of access to electricity:

- The electrification rate corresponding to the intensification of the connections of households and villages located in the areas already connected to the network.
- The access rate to electricity corresponding to the electrification of new areas.

The improvement of the rate of access to electricity must be done in line with production capacity and supply more generally in order to avoid load shedding on the grid.

Cross-border interconnections

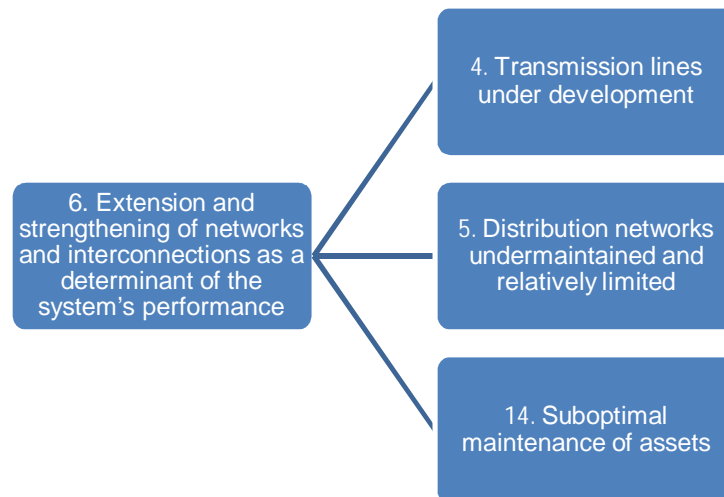
Several countries that currently have no or few power plants benefit from their proximity to producing countries through cross-border interconnections such as Benin and Togo.

These interconnections also allow the integration of national power grids into the interconnected West African grid. It is through this interconnected network that regional priority projects will be promoted.

à The development of national and cross-border electricity networks contributes to the system's performance, the increase in the electrification rate and the development of a regional electricity market.

Application

The main critical factors addressed by this action are:



6.3. Actions related to the development of major projects

6.3.1. Diversification of project implementation schemes and definition of a portfolio of sovereign guarantees

General information

Several project development modes exist, more or less adapted to the technical and financial characteristics of the projects. Today the difficulty encountered in many countries is the need to move forward simultaneously in the creation of a legislative and institutional framework and in the development of projects. This is particularly the case for PPP systems.

Project development modes

For more information on project development methods, refer to Volume 5: *Priority Investment Program and Implementation Strategy*; chapter devoted to the implementation strategy of the priority projects.

Portfolio of guarantees

The guarantees offered by the states help to make investors confident and, thus, attract private investment in countries with significant financial risks. Currently, few countries in West Africa offer a clear state guarantee portfolio for project development. Support from ECOWAS, DFIs and the IMF could help define the nature and limits of this portfolio of guarantees.

Multilateral and bilateral DFIs themselves have guarantee mechanisms covering multiple types of risks at the national level. In addition, the World Bank recently announced the future implementation of a guarantee fund for regional energy exchanges.

Particularity of interconnection projects

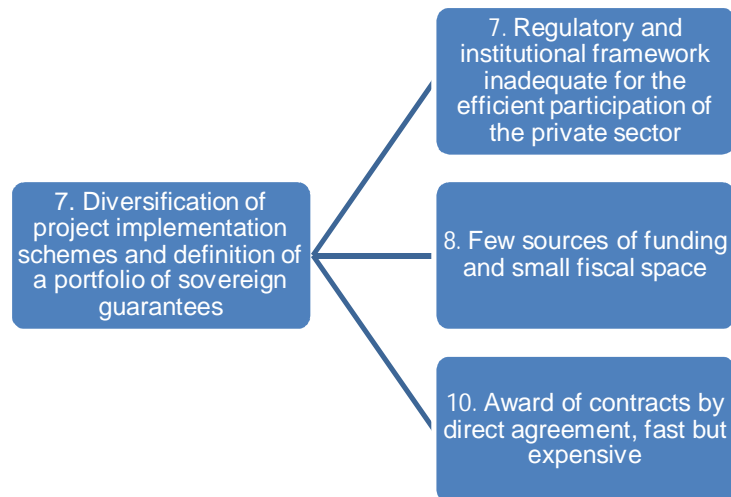
Interconnection projects are, by definition, projects shared by several countries and must be implemented simultaneously. Some examples of successful experiences in the development of such projects can be found as:

- The CLSG line through the establishment of the special purpose vehicle (SPV) Transco CLSG, which is in charge of the realization and operation of the project.
- Zimbabwe - Zambia - Botswana - Namibia Interconnection Project (ZIZABONA) split into 3 components to facilitate securing funding.
- The phasing of the MOZISA transport project between Nzhelele (South Africa) and Triangle (Zimbabwe). The phasing was done in 2 components to reduce the risks and facilitate the rapid development.

à There are different modes of project development today that involve more or less the responsibility of private actors. These modes of development are usually accompanied by guarantees granted by the host State that are important to define. In the case of cross-border interconnections the feedback of good practices needs to be studied to help the development of future projects.

Application

The main critical factors addressed by this action are:



Final version

6.3.2. Enhancement of clearness in procurement procedures

General information

The method of contract awarding is important because it determines a specific procedure, which all stages must be ordered in accordance with the principles of competition and equality. Indeed, the contracts resulting from the procurement carry important stakes both for the public person and for his co-contractor.

Importance of the procurement framework

Contracting or negotiating should be done within specific and transparent frameworks that condition the participation of financing institutions such as DFIs or financial institutions in capital or debt.

A rigorous Public Procurement Code is therefore a cornerstone for project development taking place in healthy and transparent conditions. The application of this Code is also to be ensured for legal or reputation reasons.

The case of spontaneous offers

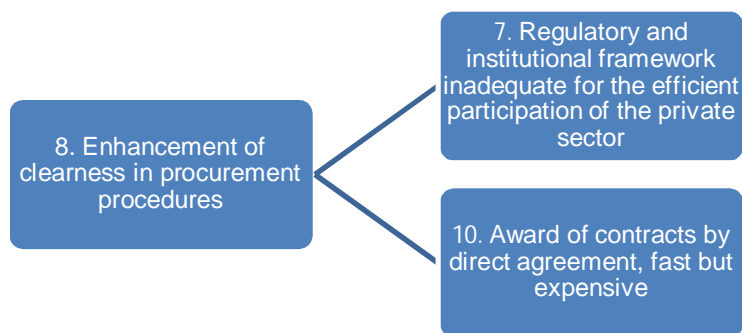
Another way of signing contracts for the public body may be the recourse by direct agreement. Following a spontaneous offer or discussion with a potential producer, the public body and its future partner negotiate terms and clauses directly. This solution nevertheless supposes the meeting of a certain number of specific conditions linked to the national legislation which must clearly be formalized.

The OTC is to be avoided when effective planning is developed to organize tenders for the construction of new infrastructure.

à The public procurement code and compliance with procurement procedures are essential elements for the involvement of international players (DFIs, private investors, banks, etc.). It is important as a planning is established to conduct procurement in a transparent and competitive manner.

Application

The main critical factors addressed by this action are:



6.3.3. Ensure efforts to secure socio-environmental budgets and anticipate preconditions

General information

The mobilization of funding to conduct studies and measures to mitigate the environmental and social impacts and relocation of people affected by projects is often a blocking element on the critical path of the project development process.

Environmental and social impact studies

Updating environmental and social studies can be a stumbling block for project implementation and delays. The anticipation of these approaches and, in particular, the mobilization of additional financing for their implementation is recommended.

Access to land

The process of obtaining the right of enjoyment of the land may, in certain cases, lead to complex procedures. These slowdowns are the result of:

- social difficulties in resettling populations
- organizational difficulties in compensating the affected population.

This is particularly the case for projects requiring a large property surface such as PV solar farms for example.

This recommendation is to be compared with the ongoing ECOWAS action for the establishment of the ECOWAS FODETE (Development and Financing Entities of the ECOWAS Transport and Energy Sectors).

à Early collaboration with DFIs and ECOWAS on these upstream approaches is seen as a way to accelerate projects.

Application

The main critical factors addressed by this action are:



6.4. Actions related to operational efficiency

6.4.1. Development of a Grid Code facilitating the optimization of the energy system

General information

The Grid Codes define in their scope of application, technical or operational requirements applicable to the different categories of actors.

The main requirements of the Grid Codes relate to:

- the connection of the new installations,
- conformity control procedures before commissioning and during the lifetime of new installations,
- the management of the whole system.

Standardization of the Grid Code

To date, only 3 countries have a national Grid Code namely Ghana, Cote d'Ivoire and Nigeria. The establishment of a regional HT Grid Code at the WAPP level would allow:

- on the one hand, to promote the establishment of the Grid Codes for the countries of the sub-region and,
- on the other hand, to standardize them in terms of connection, operation and dispatch.

This regional Code could serve as a template to be subsequently adjusted for different countries by adapting to the national energy context (consumer profiles, energy mix, institutional framework, etc.).

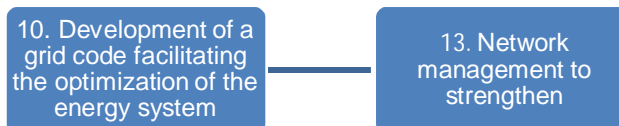
Certain procedures or technical requirements of the Grid Codes may be standardized at the WAPP regional level. This standardization at the technical level should be the result of coordination within a panel of technical experts from the different member countries of the regional organization to exchange best practice transferable.

It is also important for the Grid Code to be extended to the distribution network. Indeed, most solar PV power plants are connected at medium voltage and it is necessary to define the specific requirements for their connection and operation.

à Such a standardization could appear as a factor of harmonization of the management of the interconnections

Application

The main critical factors addressed by this action are:



6.5. Actions related to financial health

6.5.1. Financial restructuring of utilities

General information

The over-indebtedness of public utilities tends to strongly affect the national economy as well as the overall financial health of the sector at the regional level.

In the first case, the example of The Gambia can be cited where the NAWEC company is particularly indebted and in recurring bankruptcy situation directly affecting the national overall economy.

In the second case, the accumulation of the debts of the power generation companies towards the transmission and distribution companies in Togo and Benin endangers the financial balance of the electricity sector at the regional level.

Revaluation and transfer of debts

In order to ensure a better financial health of the sector, measures can be taken concerning the debts of the electricity utilities through financial restructuring of the utilities. Solutions such as:

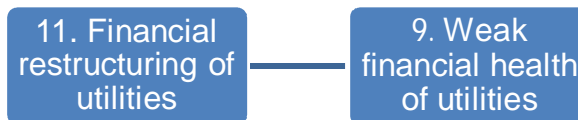
- debt settlement agreements between companies or between companies and the State,
 - capitalization of corporate debts to the State,
 - debt cancellation or
 - retrocession of debts at the state budget level
- could be considered.

These measures should be discussed and developed with the help and advice of international organizations such as the IMF for example.

à The indebtedness of the electricity companies must be curbed by the cancellation of debts or retrocession at the level of public finances of the State to ensure a better financial health to the sector.

Application

The main critical factors addressed by this action are:



6.5.2. Activity-based costing and an annual financial statements audits to improve transparency

General information

It is necessary for vertically integrated utilities to have a rigorous knowledge of their benefits and costs on each of their services. The establishment of a cost accounting between the various activities of the value chain becomes necessary. This separation takes place through the establishment of an activity-based costing between the various major activities of the company.

Clearance of accounts, meanwhile, refers to the operation of verifying the accounts of a company in the context of a final review to ensure the regularity of accounts and transactions transcribed.

Finally, the audit of accounts is the activity of revising and verifying the accounting documents. Its purpose is to determine whether the annual accounts of a company accurately reflect the assets and financial position of the audited entity, in accordance with generally accepted accounting principles.

Rigorous accounting

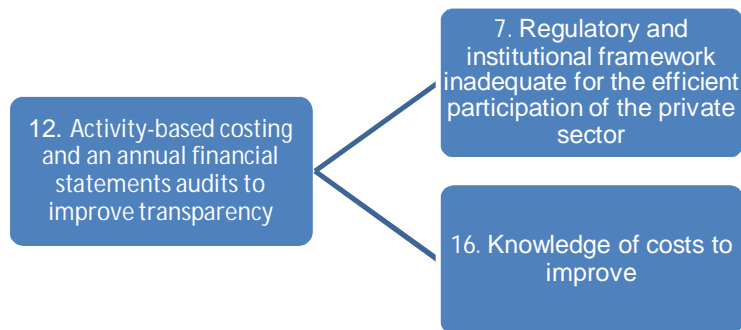
Cost accounting brings each activity closer to its costs and divides the results by decision-making center for better management and to better assess the situation.

Rigorous accounting through cost accounting and auditing accounts avoids any negligence in the accounting of electricity utilities in charge of a portion of the public funds. These practices should be systematically introduced in the various utilities.

à These accounting actions must be carried out in coordination with the Court of Auditors of the country and the relevant departments of CEDEOA, where appropriate to provide specific advice to the sector.

Application

The main critical factors addressed by this action are:



6.6. Actions related to commercial efficiency

6.6.1. Standardization of import / export contractual clauses to facilitate trades

General information

The implementation of the export and import of electricity is embodied in a power purchase agreement (PPA) in order to spread the costs and risks between the seller and the buyer.

Standardization of clauses

In a process of facilitation in the establishment of these contracts certain clauses could be standardized. These clauses concern: the contractors, the nature of the contract, the prices and method of payment, the terms of delivery, certain technical requirements, force majeure, risks, guarantees, the law applicable to the contract, the jurisdiction (in case of litigation).

Risk sharing is a crucial step in the agreement. While the allocation of certain risks is obvious, there are others for which none of the parties seem naturally more able to support them. They are part of the elements to be discussed on a case by case basis. These risks, once shared, must be evaluated and a cost allocated in order to integrate them into the financial conditions of the project.

Adaptation of contracts and market trading platform

Given, on the one hand, types of electricity generation diversification through the development of new renewable technologies and, on the other hand, the implementation of an interconnected regional network, new tools for the exchange of electricity and contractualisation should appear. These tools to be put in place would contribute to market fluiding and resource recovery.

Like the South African Power Pool (SAPP), the introduction of market trading platforms would encourage these exchanges. Several platforms are conceivable as:

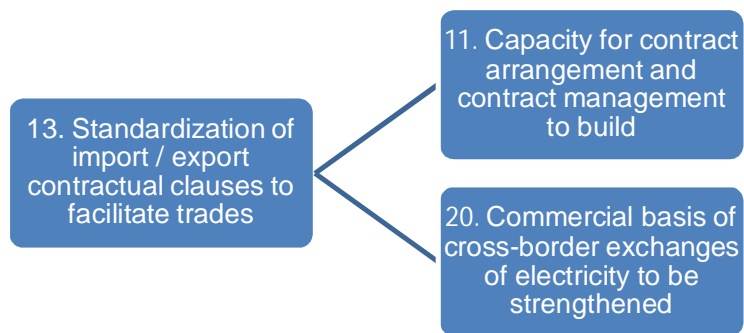
- Long-term platform,
- Day-ahead fixing market platform
- Intraday trading platform

These platforms would also assess energy imbalance and loss calculation in coordination with the ICC.

à The standardization of certain clauses of these agreements will facilitate binational and multinational exchanges with a in a goal of simplification of the market. In a longer-term vision, the establishment of market trading platforms would contribute to market fluiding and resource valuation in a context of diversified mix and largely interconnected network.

Application

The main critical factors addressed by this action are:



6.6.2. Implementation of customer management software and call centers

General information

The knowledge of the customer profile and the billing activities all contribute to the good commercial management of a company. The customers' profile and the identification of their needs allows the electricity company to adapt its offer and better meet their expectations. The billing activity remains to be improved, as well as the recovery of invoices whose rates vary between 80% and 96% for most countries of the region.

International experience suggests that unmetered consumption is disproportionately concentrated in large consumers and others who are able to pay cost-reflective tariffs. By targeting better-off, large-volume customers first, significant loss reduction is possible with little loss of welfare: “Reducing losses from unmetered consumption and inefficient bill collection—and sustaining such loss reduction over time—is much more important than addressing overstaffing, particularly against a backdrop of increasing demand and the need for rapid capacity expansion in every country.” - *Making Power Affordable for Africa and Viable for Its Utilities*, M. Kojima and C. Trimble, World Bank Group, 2016, p. 34.

Improvement of commercial management

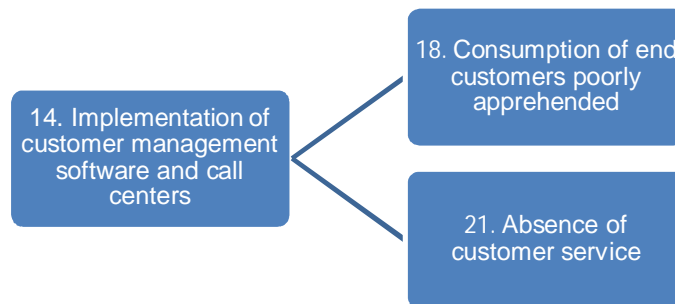
Efforts must then be made on:

- customer loyalty, especially key accounts, which may tend to turn to self-consumption solutions whereas they are a significant portion of the corporate income;
- communication with potential future customers wishing to be connected to the national grid and ready to make a financial commitment to enjoy this service;
- consumption patterns understanding of the customers through the analysis of their profiles (resident, commercial, industrial, public administration, ...).

à The implementation of customer management softwares and call centers appears necessary for a better commercial management of the utilities.

Application

The main critical factors addressed by this action are:



6.6.3. Implementation of prepaid meters and decentralization of invoice and bill collection activities

General information

Many families are struggling to pay their electricity bills, bills that are generally weighed down using new appliances or energy-consuming and obsolete appliances. These payment difficulties lead most often:

- Power cuts, which also entails charges for unpaid, cut-offs, and then recovery when the debts have been repaid;
- Illegal connections upstream of the meters.

Suggested solutions

Faced with this process of exclusion from the systematic shutdown weighed down by complex power-up procedures, some electricity utilities - such as SONABEL - have adopted the prepaid meters solution. On the one hand, customers benefit from anticipation and control of their consumption while having the possibility of regularly paying small sums based on their cash flow and; on the other hand, power utilities are assured of receiving an advance payment.

However, several limits have already been identified in terms of implementation and operation phase of the prepayment meters that must be exceeded. These limits concern in particular:

- Donor-funded projects (frequently IFIs) with a funding restricted to a limited number of modules that do not ensure their implementation for new network connections. The benefits made by the meters have a higher inertia than the deployment needs of the modules.
- The implementation of this solution was not always carried out in a global project approach that also included the training of technicians for the maintenance of the modules.
- Frequency disturbances on the network appeared to be factors of deterioration of the modules.
- When the management, operation and maintenance of the devices were delegated to private companies, it was not always anticipated that a rigorous follow-up was also necessary by the utility.

The solutions envisaged to cope with these difficulties in order to perpetuate this system are:

- Harmonization of procedures standards and technology for prepaid meters so as to pool efforts in terms of training and South-South coordination.
- The systematic realization of ex-post studies and their dissemination to the relevant actors.

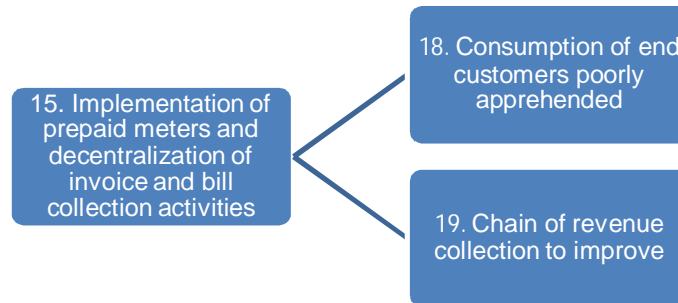
In addition, to fight again non-technical / commercial losses, The Gambia has established a fraud detection and prevention department to limit these types of losses. This police would be allowed to apply penalties to fraudsters.

Finally, as in Ethiopia, the decentralization of invoicing and bill collection activities by delegation of powers to regional agencies could be considered when the context allows. This organization would reduce the decision-making chain and improve the efficiency of procedures.

à The electricity utilities' revenue improvement can pass through the adoption of prepaid meters, the establishment of a dedicated police to fight against non-technical losses and the decentralization of the billing expertise to local agencies.

Application

The main critical factors addressed by this action are:



6.7. Actions related to the development of skills

6.7.1. Technical and legal support to be strengthened by DFIs

General information

Specific skills on technical issues related to the new intermittent renewable energies are increasingly being felt.

Similarly, expertise in drafting and negotiating specific contracts to the electricity sector also appeared. This need is particularly felt in the case of concession and power purchase agreements (PPAs).

Use of DFIs

The purpose of the DFIs is to support the development of projects and to participate in their financing. These DFIs therefore have experts with specific expertise needed for the various stages of project development, both on technical and contractual issues.

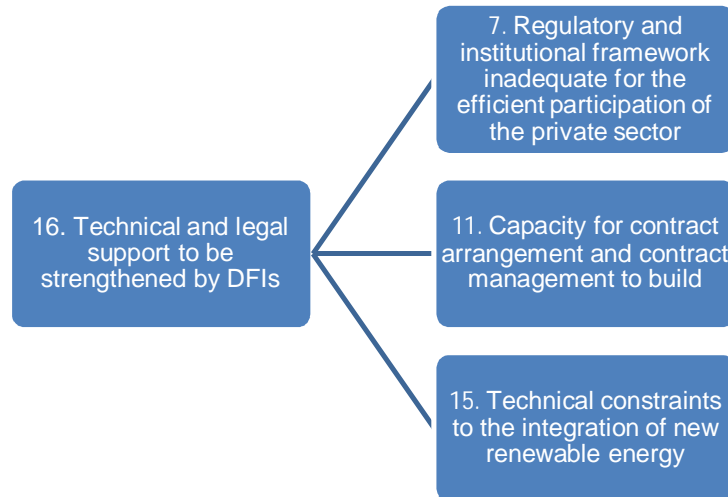
The involvement of DFIs in the development of a project involving private investors appears as a win-win formula. The DFIs allow to bring:

- Support on technical issues to the utility,
- Support on contractual drafting and negotiation issues to the utility and / or the State and,
- Guarantees to the investor or private developer concerning:
 - the use of partial risk guarantees
 - validation and monitoring of environmental and social studies
 - protection against reputational risk
 - the guarantee of the establishment of the adequate legal and institutional framework for the development of the project

à DFIs conduct actions to develop projects in the best expected conditions. They also have technical and legal expertise that can be made available to States and electricity utilities if they are requested relatively upstream of the projects.

Application

The main critical factors addressed by this action are:



6.7.2. Technical and contractual capacities to be strengthened through the regional university network

General information

The electricity sector is a complex sector of activity that combines technical, financial, economic, social, environmental and legal aspects with, moreover, paradigm shifts driven by:

- the development of new intermittent renewable energy generation technologies,
- new modes of project development (PPP, IPP, concessions, ...) involving new players from the private sector and,
- New international standards on social and environmental impacts,

The development of new skills becomes essential in order to cope with these upheavals.

Development of partnerships with the regional university network

As a result, new professions are emerging within electricity utilities that can not always be compensated by recruiting new recruits because of their low experience or by the necessary budgetary effort.

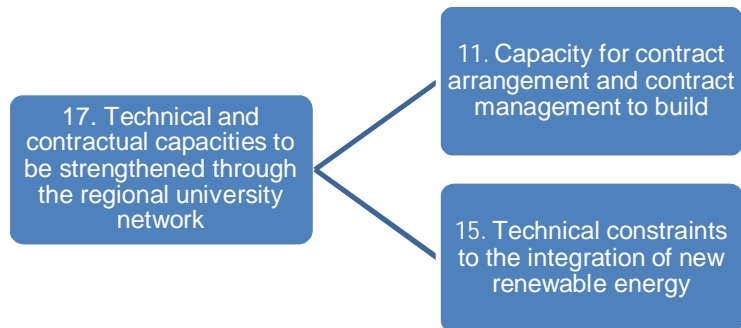
One solution is therefore to build partnerships with the region's various universities teaching law, engineering, finance, economics, etc. These partnerships would serve to facilitate:

- Recruitment of initial training and
- Qualification of staff by setting up targeted continuous training courses.

→ To this end, the WAPP may consider releasing a funding line for training support and upgrading competency on these subjects to universities to deliver these courses.

Application

The main critical factors addressed by this action are:



6.8. Synthesis of the main measures and corrective actions








Topics	Remedial actions
 Governance	<ul style="list-style-type: none"> • 1. Appropriate use of management contracts • 2. Reinforcement of the regulator's role and its prerogatives on electricity tariff mechanisms • 3. Reorganization of utilities' structures to better match the market
 Planning	<ul style="list-style-type: none"> • 4. Capitalization of the ICC and improve dispatching procedures • 5. Harmonization of master plans, strategic plans and roadmaps • 6. Extension and strengthening of networks and interconnections as a determinant of the system's performance
 Development of large projects	<ul style="list-style-type: none"> • 7. Diversification of project implementation schemes and definition of a portfolio of sovereign guarantees • 8. Enhancement of clearness in procurement procedures • 9. Ensure efforts to secure project budgets and anticipate preconditions
 Operational efficiency	<ul style="list-style-type: none"> • 10. Development of a grid code facilitating the optimization of the energy system
 Financial health	<ul style="list-style-type: none"> • 11. Financial restructuring of utilities • 12. Activity-based costing and an annual financial statements audits to improve transparency
 Commercial efficiency	<ul style="list-style-type: none"> • 13. Standardization of import / export contractual clauses to facilitate trades • 14. Implementation of customer management software and call centers • 15. Implementation of prepaid meters and decentralization of invoice and bill collection activities
 Skills development	<ul style="list-style-type: none"> • 16. Technical and legal support to be strengthened by DFIs • 17. Technical and contractual capacities to be strengthened through the regional university network

Figure 14: Synthesis of the main measures and corrective actions

7. SYNTHESIS ON ACTIONS TREATING THE PRIORITY CRITICAL FACTORS

7.1. Actions addressing priority critical factors

On the basis of the above elements, a list of actions and measures to address the priority challenges and critical factors can be drawn up.

As a reminder, the priority critical factors are those that meet the criteria of priority 1, namely: impacting, transverse and addressable.

In the following a reconciliation between corrective actions and critical factors is performed. The priority critical factors and the actions to deal with them are linked. This comparison follows the logigrams presented at the end of each action in the previous chapter.

The following figure shows the actions dealing with critical factors of priority 1.

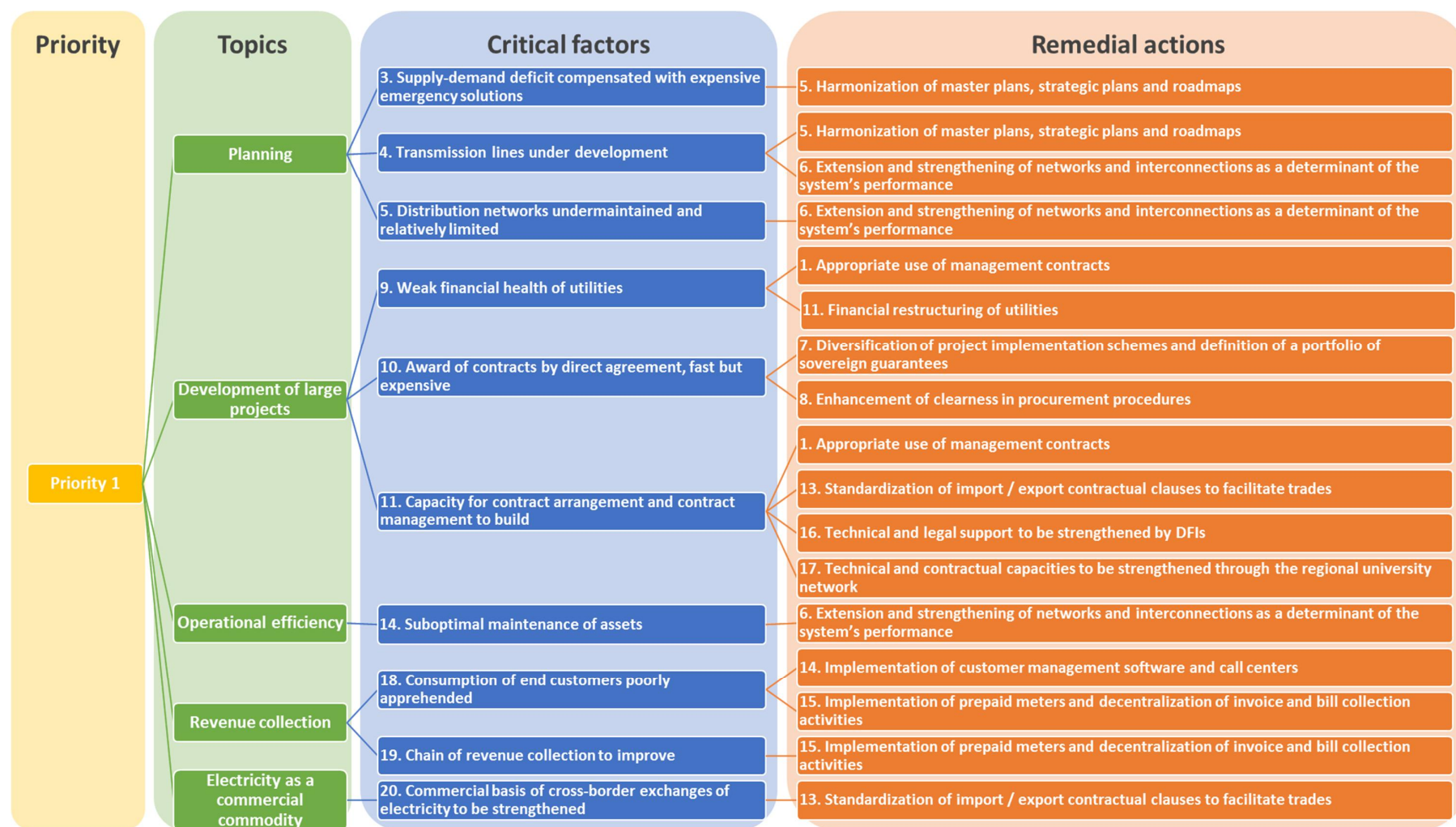


Figure 15: Corrective actions addressing priority 1 critical factors

7.2. Prioritization of the corrective actions

A prioritization of the corrective actions is carried out on the basis of the critical factors that can be treated by them. This hierarchy allows actions to be ranked according to a certain degree of importance. Transverse actions to priority critical factors are considered important.

The prioritization of the corrective actions is carried out on a scale based on four levels:

Level 1

Level 1 corresponds to actions addressing at least three critical priority factors i.e impacting, transverse and addressable.

Level 2

Level 2 corresponds to actions addressing at least two critical priority factors i.e impacting, transverse and addressable.

Level 3

Level 3 corresponds to actions dealing with a single critical priority factor i.e impacting, transverse or addressable.

Level 4

Level 4 corresponds to actions carryable by the utilities dealing with other critical factors without addressing those with first priority.

Sectoral actions

The sectoral actions are those corresponding to the critical factors that can not be addressed by the utilities in relation to the sector strategy. They respond to issues of governance, sectoral organization and regulation and regulatory and institutional framework.

Actions from levels 1, 2 and 3 may also address non-priority critical factors.

The figure below shows this hierarchy.

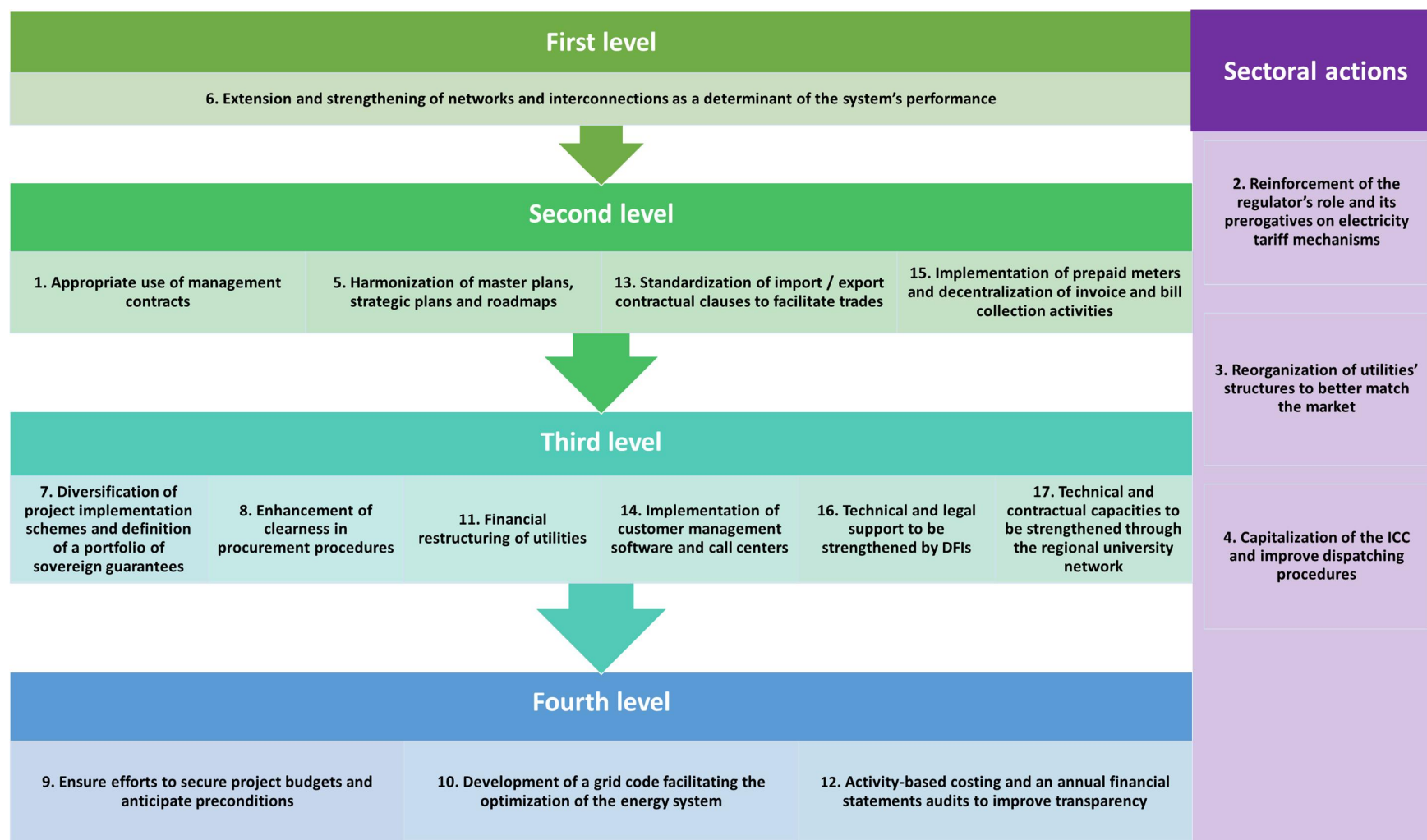


Figure 16: Prioritization of actions relating to priority 1 critical factors addressed

7.3. Activities carryable by the WAPP

The WAPP, through its regional influence, can carry out certain activities facilitating the implementation of transverse corrective actions. These activities are grouped by typology:

- Information share and communication activities
- Coordination activities
- Consulting activities
- Proactive steps

Information share and communication on best practices activities

Information share and communication on transposable best practices activities can be carried out by the WAPP through:

- Gathering and centralizing feedbacks from previous management contracts in Guinea and Liberia. The WAPP's comparative audit could highlight areas of vigilance and best practice for future experiments.
- A valorization of the ICC by a communication campaign in the different member countries.
- A market study and an ex post analysis on the prepaid meters adoption in Burkina Faso, Senegal and Togo. Such analysis might help to better understand how their implementation could be conducted in other countries of the region.

Coordination activities

Coordination activities can be carried out by the WAPP through:

- Coordination between the Ecowas Regional Electricity Regulatory Authority (ERERA) and the administrative authorities of the different member countries in the framework of the establishment or strengthening of the prerogative of the national regulator.
- Multi-country coordination for the development of electricity transmission networks and interconnections through its regional vision of the electricity sector.
- Coordination with DFIs on various topics related to project development and improvement of sectoral organization, namely:
 - The creation of a legislative and institutional framework for project development and the opportunity to transpose it to different countries;
 - Planning of upstream project development approaches concerning the environmental and social impact studies and measures, particularly on regional priority projects;
 - The transfer of technical and legal expertise from DFIs to administrations and electricity utilities.

Consulting activities

Consulting activities can be carried out by the WAPP through:

- Standardization of procedures and technical requirements in the development of national Grid Codes.
- Recommendations during the development of national master plans through a participation or consultation during this elaboration in order to ensure their harmonization with the regional master plan.
- Standardization of certain contractual clauses of electricity import / export agreements in order to facilitate multinational exchanges with a view to fluidizing the market. [Mainly to be strengthened as this activity has already been conducted by the WAPP.]

Proactive steps

Proactive steps can be carried out by the WAPP through the release of a funding line for training utilities employees to improve new sectoral skills. This would be accompanied by the formalization of partnerships between the WAPP and the region's universities specialized in technical, financial, economic and legal matters.

ANNEXES

The annexes to this volume correspond to the action plans for each WAPP member utility.

The critical factors and actions presented are those applied to the electricity sector at the national level. In bold are presented the actions on which the utility is directly involved.

The budget is the effort needed to implement the actions. Four levels are then considered:

- +++: Large investment (tens or even hundreds of millions of USD)
- ++: Moderate investment (at most a few million USD)
- +: Light investment (at most a few tens of thousands of USD)
- -: Do not need a real investment

The indicative timeline gives information on the implementation duration of the actions.


The stakeholders provide information on the organizations and institutions from which utilities or administrative authorities can come together to implement the actions.

The activities carried out are the activities already undertaken by the utilities.

These plans are presented below in the form of individual fact sheets for easy reading. The companies are:


- SBEE - Benin
- CEB – Benin/Togo
- SONABEL – Burkina Faso
- CI-ENERGIES – Cote d'Ivoire
- NAWEC – The Gambia
- ECG - Ghana
- GRIDCO - Ghana
- NEDCO - Ghana
- VRA - Ghana
- EDG - Guinea
- EAGB – Guinea-Bissau
- LEC - Liberia
- EDM-SA - Mali
- NIGELEC - Niger
- NBET - Nigeria
- TCN - Nigeria
- SENELEC - Senegal
- EDSA – Sierra Leone
- CEET - Togo

SBEE – Benin

SBEE - Benin 			
<u>Critical factors identified:</u> <ul style="list-style-type: none"> 1. Sectoral governance often problematic 6. Energy mix little diversified 9. Weak financial health of utilities 13. Network management to strengthen 14. Suboptimal maintenance of assets 			
<u>Adapted actions:</u> <ul style="list-style-type: none"> 1. Appropriate use of management contracts 2. Reinforcement of the regulator's role and its prerogatives on electricity tariff mechanisms 4. Capitalization of the ICC and improve dispatching procedures 5. Harmonization of master plans, strategic plans and roadmaps 6. Extension and strengthening of networks and interconnections as a determinant of the system's performance 10. Development of a grid code facilitating the optimization of the energy system 	<u>Budget :</u> <ul style="list-style-type: none"> ++ + - - +++ + 	<u>Indicative timeline :</u> <ul style="list-style-type: none"> 3-5 years Long term Long term Continuous Long term 1-3 years 	<u>Stakeholders :</u> <ul style="list-style-type: none"> Private companies / DFI ERERA / DFI WAPP WAPP / ECREEE DFI / International investors WAPP / DFI / APUA

11. Revaluation of debt between utilities	++	1-5 years	IMF / Supervising Ministry
<p><u>Activities already undertaken :</u></p> <ul style="list-style-type: none"> • The project of reforms and institutional strengthening • The electricity generation project • The project of electricity distribution • Access to electricity off-grid project • The management contract of the SBEE 			

CEB – Benin/Togo

CEB – Bénin/Togo 			
<u>Critical factors identified:</u> 9. Weak financial health of utilities 14. Suboptimal maintenance of assets			
<u>Adapted actions:</u> 6. Extension and strengthening of networks and interconnections as a determinant of the system's performance 11. Financial restructuring of utilities	<u>Budget :</u> +++ ++	<u>Indicative timeline :</u> Long term 1-5 years	<u>Stakeholders :</u> DFI / International investors IMF / Supervising Ministry
<u>Activities already undertaken :</u> n.a			

SONABEL – Burkina Faso



SONABEL – Burkina Faso

Critical factors identified:

1. Sectoral governance often problematic
3. Supply-demand deficit compensated with expensive emergency solutions
5. Distribution networks undermaintained and relatively limited
13. Network management to strengthen
16. Knowledge of costs to improve

Adapted actions:

2. Reinforcement of the regulator's role and its prerogatives on electricity tariff mechanisms
4. Capitalization of the ICC and improve dispatching procedures
5. **Harmonization of master plans, strategic plans and roadmaps**
6. **Extension and strengthening of networks and interconnections as a determinant of the system's performance**
10. **Development of a grid code facilitating the optimization of the energy system**

Budget :

+
-
-
+++
+

Indicative timeline :

Long term
Long term
Continuous
Long term
1-3 years

Stakeholders :

ERERA / DFI
WAPP
WAPP / ECREEE
DFI / International investors
WAPP / DFI / APUA

12. Activity-based costing and an annual financial statements audits to improve transparency	+	1-3 years	Court of Audit / ECOWAS
<p><u>Activities already undertaken :</u></p> <p>Power supply faults</p> <p>To address the critical factors identified above, the Department in charge of energy intends to implement the energy program. This program is aimed at making energy available and accessible to all. It comes in 7 shares the first two concern electricity:</p> <p>Action 1: Electric energy supply</p> <p>To ensure a supply of regular, secure, sustainable and cost of electrical energy, it will be undertaken:</p> <ul style="list-style-type: none"> • The construction of electric interconnections under regional through the system of exchange of energy electric West African (master) • Building the capacity of local productions • The diversification of the sources of electric energy production • The constitution of the National Interconnected network <p>Action 2: Accessibility of electric service</p> <p>The expansion of access to electric service will result in:</p> <ul style="list-style-type: none"> • The electrification of new localities by expansion of network • The densification of electric network in communities already electrified • Promoting decentralized solutions <p>At the same time, the increase in electricity access will promote the activities of the private sector and will collect additional revenue.</p> <p>Financial stability</p> <p>The Government ensures the financial stability of the energy sector. Regarding the electricity sub-sector, the aim is to ensure the financial viability of SONABEL and SONABHY through, including:</p> <ul style="list-style-type: none"> • the clearance of debts of SONABEL towards the SONABHY • the fixing of a ceiling price for the purchase of fuel from SONABEL to the SONABHY 			


- the adoption of a plan of protection of the income of the SONABEL

Opening the market to the private sector

For the implementation of investment projects, the Government shows willingness to involve private through the private public partnerships (PPP). This use of PPPs is part of the economic policy of the Government. To do this, an institutional and legal framework has been implemented at the national level.

The realization of some major projects in the sector of energy in the form of PPPs is being considered. SONABEL will therefore be faced with new players for which he will have to learn to manage a new contractual relationship.

CI-ENERGIES – Côte d'Ivoire

CI-ENERGIES – Cote d'Ivoire 			
<u>Critical factors identified:</u> 6. Energy mix little diversified 11. Capacity for contract arrangement and contract management to build 19. Chain of revenue collection to improve			
<u>Adapted actions:</u> 5. Harmonization of master plans, strategic plans and roadmaps 13. Standardization of import / export contractual clauses to facilitate trades 15. Implementation of prepaid meters and decentralization of invoice and bill collection activities 16. Technical and legal support to be strengthened by DFIs 17. Technical and contractual capacities to be strengthened through the regional university network	<u>Budget :</u> - - ++ - +	<u>Indicative timeline :</u> Continuous 1-3 years 1-5 years Continuous Continuous	<u>Stakeholders :</u> WAPP / ECREEE WAPP DFI DFI WAPP / APUA
<u>Activities already undertaken :</u> The Government has taken many measures to increase transparency and ensure good governance of the energy sector, which helped to create a climate of trust with investors. Ivory Coast through the support of the State has launched a process for the collection of arrears export including penalties.			

The government has agreed to the completion of four master plans in all segments of the electricity sector in order to streamline the sequence of investments over the period 2014-2030. These master plans present as major issues:

- i) security of supply;
- ii) the reliability of the system,
- iii) the development of renewable energies,
- iv) the quality of service and
- v) access to electricity for all, especially in rural areas.


A coherent planning program for investments in the electricity sector over the period 2014-2030 was therefore designed through the implementation of the four (04) Master Plans: Generation-Transport, Distribution, Automation-Telecontrol and Rural Electrification. These master plans made it possible to translate into an investment program the vision of the Government of Côte d'Ivoire, to make Côte d'Ivoire the main player in the sub-regional energy market and to achieve the total electrification of the region. Ivory Coast.

Through legal and contractual, the Government puts all means implemented to provide training to the staff of the energy sector. By way of illustration, article 53 of the oil code States that « from the beginning of the petroleum operations, the oil contract holder must establish and fund a program of training of Ivorian staff of all qualifications, in the conditions that are laid down in the oil contract ». All four master plans mentioned above also contain a large section dedicated to the training of CI-ENERGIES teams.

In addition, the Government has implemented a scholarship device that allows young people to pursue studies of high level in Côte d'Ivoire or abroad.


Eventually, Recruitment and training effort will be maintained in the coming years to ensure a good control of the transition from the Ivorian electrical system.

NAWEC – The Gambia

NAWEC – Gambia 			
<u>Critical factors identified:</u> <ul style="list-style-type: none"> 2. Areas of responsibilities sometimes unclear 3. Supply-demand deficit compensated with expensive emergency solutions 9. Weak financial health of utilities 14. Suboptimal maintenance of assets 16. Knowledge of costs to improve 17. Tariffs not reflecting the real costs of the sector 			
<u>Adapted actions:</u> <ul style="list-style-type: none"> 1. Appropriate use of management contracts 2. Reinforcement of the regulator's role and its prerogatives on electricity tariff mechanisms 3. Reorganization of utilities' structures to better match the market 5. Harmonization of master plans, strategic plans and roadmaps 6. Extension and strengthening of networks and interconnections as a determinant of the system's performance 11. Financial restructuring of utilities 	<u>Budget :</u> <ul style="list-style-type: none"> ++ + + / ++ - +++ ++ 	<u>Indicative timeline :</u> <ul style="list-style-type: none"> 3-5 years Long term 1-5 years Continuous Long term 1-5 years 	<u>Stakeholders :</u> <ul style="list-style-type: none"> Private companies / DFI ERERA / DFI Utilities / APUA WAPP / ECREEE DFI / International investors IMF / Supervising Ministry

12. Activity-based costing and an annual financial statements audits to improve transparency	+	1-3 years	Court of Audit / ECOWAS
<p><u>Activities already undertaken :</u></p> <p>Development plan and sectoral policy The implementation of a roadmap in 2017 for the electricity sector is a particularly important turning point. This road map is accompanied by a strong will to achieve rigorous planning of the sector for the coming years.</p> <p>à The cost of the offering is expected to decline to medium and long term through the development of projects of OMVG.</p> <p>Non-technical losses A campaign to control non-technical losses (fraud) has been launched: it relies on a "police" or "brigade" whose mission is to identify the sites on which fraud is proven.</p> <p>Accounting separation An accounting separation between the different activities is launched over the period 2018-2020. It will provide specific performance indicators and thus determine the financing needs of each of the activities.</p>			

ECG – Ghana


ECG – Ghana 			
<p><u>Critical factors identified:</u></p> <ul style="list-style-type: none"> 2. Areas of responsibilities sometimes unclear 3. Supply-demand deficit compensated with expensive emergency solutions 9. Weak financial health of utilities 10. Award of contracts by direct agreement, fast but expensive 11. Capacity for contract arrangement and contract management to build 17. Tariffs not reflecting the real costs of the sector 			
<p><u>Adapted actions:</u></p> <ul style="list-style-type: none"> 2. Reinforcement of the regulator's role and its prerogatives on electricity tariff mechanisms 3. Reorganization of utilities' structures to better match the market 5. Harmonization of master plans, strategic plans and roadmaps) 11. Financial restructuring of utilities 	<p><u>Budget :</u></p> <ul style="list-style-type: none"> + + / ++ - ++ 	<p><u>Indicative timeline :</u></p> <ul style="list-style-type: none"> Long term 1-5 years Continuous 1-5 years 	<p><u>Stakeholders :</u></p> <ul style="list-style-type: none"> ERERA / DFI Utilities / APUA WAPP / ECREEE IMF / Supervising Ministry

Activities already undertaken :


Network

Projects aimed at strengthening the regional network have materialized and should all be put into operation soon reinforcing coastal links with Ivory Coast and Togo. Connections to the North is expected to export to Burkina Faso and Mali, which will add value to investments made on the Ghanaian production Park.

GRIDCO – Ghana

GRIDCO – Ghana 			
<u>Critical factors identified:</u> <ul style="list-style-type: none"> 2. Areas of responsibilities sometimes unclear 3. Supply-demand deficit compensated with expensive emergency solutions 9. Weak financial health of utilities 10. Award of contracts by direct agreement, fast but expensive 11. Capacity for contract arrangement and contract management to build 17. Tariffs not reflecting the real costs of the sector 			
<u>Adapted actions:</u> <ul style="list-style-type: none"> 5. Harmonization of master plans, strategic plans and roadmaps) 11. Financial restructuring of utilities 13. Standardization of import / export contractual clauses to facilitate trades 	<u>Budget :</u> <ul style="list-style-type: none"> - ++ - 	<u>Indicative timeline :</u> <ul style="list-style-type: none"> Continuous 1-5 years 1-3 years 	<u>Stakeholders :</u> <ul style="list-style-type: none"> WAPP / ECREEE IMF / Supervising Ministry WAPP
<u>Activities already undertaken :</u> <p>Network</p> <p>Projects aimed at strengthening the regional network have materialized and should all be put into operation soon reinforcing coastal links with Ivory Coast and Togo. Connections to the North is expected to export to Burkina Faso and Mali, which will add value to investments made on the Ghanaian production Park.</p>			

NEDCO – Ghana

NEDCO – Ghana 			
<u>Critical factors identified:</u> <ul style="list-style-type: none"> 2. Areas of responsibilities sometimes unclear 3. Supply-demand deficit compensated with expensive emergency solutions 9. Weak financial health of utilities 10. Award of contracts by direct agreement, fast but expensive 11. Capacity for contract arrangement and contract management to build 17. Tariffs not reflecting the real costs of the sector 			
<u>Adapted actions:</u> <ul style="list-style-type: none"> 2. Reinforcement of the regulator's role and its prerogatives on electricity tariff mechanisms 3. Reorganization of utilities' structures to better match the market 5. Harmonization of master plans, strategic plans and roadmaps) 11. Financial restructuring of utilities 	<u>Budget :</u> <ul style="list-style-type: none"> + + / ++ - ++ 	<u>Indicative timeline :</u> <ul style="list-style-type: none"> Long term 1-5 years Continuous 1-5 years 	<u>Stakeholders :</u> <ul style="list-style-type: none"> ERERA / DFI Utilities / APUA WAPP / ECREEE IMF / Supervising Ministry
<u>Activities already undertaken :</u>			

VRA – Ghana

VRA – Ghana



Critical factors identified:

- 2. Areas of responsibilities sometimes unclear
- 3. Supply-demand deficit compensated with expensive emergency solutions
- 9. Weak financial health of utilities
- 10. Award of contracts by direct agreement, fast but expensive
- 11. Capacity for contract arrangement and contract management to build
- 17. Tariffs not reflecting the real costs of the sector

Adapted actions:

- 2. Reinforcement of the regulator's role and its prerogatives on electricity tariff mechanisms
- 3. Reorganization of utilities' structures to better match the market
- 5. Harmonization of master plans, strategic plans and roadmaps
- 7. Diversification of project implementation schemes and definition of a portfolio of sovereign guarantees
- 8. Enhancement of clearness in procurement procedures
- 11. **Financial restructuring of utilities**
- 16. Technical and legal support to be strengthened by DFIs

Budget :

- +
- + / ++
-
- +
- +
- ++
-

Indicative timeline :

- Long term
- 1-5 years
- Continuous
- 1-3 years
- 1-3 years
- 1-5 years
- Continuous

Stakeholders :

- ERERA / DFI
- Utilities / APUA
- WAPP / ECREEE
- ECOWAS / DFI / IMF / Supervising Ministry
- DFI / Supervising Ministry
- IMF / Supervising Ministry
- DFI

17. Technical and contractual capacities to be strengthened through the regional university network	+	Continuous	WAPP / APUA
Activities already undertaken :			

EDG - Guinea

EDG – Guinea



ELECTRICITÉ
DE GUINÉE

Critical factors identified:

- 3. Supply-demand deficit compensated with expensive emergency solutions
- 4. Transmission lines under development
- 7. Regulatory and institutional framework inadequate for the efficient participation of the private sector
- 8. Few sources of funding and small fiscal space
- 9. Weak financial health of utilities
- 11. Capacity for contract arrangement and contract management to build
- 17. Tariffs not reflecting the real costs of the sector
- 20. Commercial basis of cross-border exchanges of electricity to be strengthened

Adapted actions:

- 1. **Appropriate use of management contracts**
- 2. Reinforcement of the regulator's role and its prerogatives on electricity tariff mechanisms
- 5. **Harmonization of master plans, strategic plans and roadmaps**
- 6. **Extension and strengthening of networks and interconnections as a determinant of the system's performance**

Budget :

++
+
-
+++

Indicative timeline :

3-5 years
Long term
Continuous
Long term

Stakeholders :

Private companies / DFI
ERERA / DFI
WAPP / ECREEE
DFI / International investors

Final version

7. Diversification of project implementation schemes and definition of a portfolio of sovereign guarantees	+	1-3 years	ECOWAS / DFI / IMF / Supervising Ministry
8. Enhancement of clearness in procurement procedures	+	1-3 years	DFI / Supervising Ministry
12. Activity-based costing and an annual financial statements audits to improve transparency	+	1-3 years	Court of Audit / ECOWAS
13. Standardization of import / export contractual clauses to facilitate trades	-	1-3 years	WAPP
15. Implementation of prepaid meters and decentralization of invoice and bill collection activities	++	1-5 years	DFI
16. Technical and legal support to be strengthened by DFIs	-	Continuous	DFI
17. Technical and contractual capacities to be strengthened through the regional university network	+	Continuous	WAPP / APUA

Other critical factors identified by EDG

The strategic diagnosis of the transmission infrastructure reveals that the main issues concern the network maintenance and the further development of the network to meet the increase in supply. Like the transmission network, distribution network requires a large upgrade, particularly as regards the structure of the network, the maintenance of the works, the modern management tools and the resources made available.

The strategic diagnosis of the commercial function reveals that the main challenges concern the deployment of smart meters, the modernization of commercial management and the diversification of payment methods.

EDG's main challenges in terms of Human Resources management focus on skills management, ensuring the adequacy of job profiles and the revitalization of staff motivation policy. EDG is characterized today by an aging workforce, with an average age of 45, half of whom have over 15 years of seniority. The age pyramid translates for EDG an internal context marked by:

- i) a majority of experienced agents, but rather closed to innovation and often unfamiliar with new technologies,
- ii) poor development opportunities for young people,
- iii) high risks of loss of key skills in the absence of a real succession strategy,
- iv) a significant salary burden taking into account the levels in the salary grid,
- v) a decline in productivity in certain trades (eg technical) and

vi) less willingness to work.

In order to secure the workforce and cover all of EDG's retirements by 2021, it will be necessary to make new recruitments as necessary, first ensuring the optimization of the level of adequacy of workload and manpower.

Activities already undertaken :

- The implementation of the EDG management contract and the actions carried out by the government (strategic development plans, sectoral law, etc.) should stabilize the Guinean electricity sector.
- This stability is a guarantee sought by the donors. It should therefore facilitate the release of funding for the many projects already identified

EAGB – Guinea-Bissau

EAGB – Guinea Bissau



Critical factors identified:

1. Sectoral governance often problematic
3. Supply-demand deficit compensated with expensive emergency solutions
5. Distribution networks undermaintained and relatively limited
8. Few sources of funding and small fiscal space9. Une faible santé financière des entreprises du secteur
13. Network management to strengthen
14. Suboptimal maintenance of assets
18. Consumption of end customers poorly apprehended

Adapted actions:

1. **Appropriate use of management contracts**
2. Reinforcement of the regulator's role and its prerogatives on electricity tariff mechanisms
5. **Harmonization of master plans, strategic plans and roadmaps**
6. **Extension and strengthening of networks and interconnections as a determinant of the system's performance**
7. Diversification of project implementation schemes and definition of a portfolio of sovereign guarantees

Budget :

++
+
-
+++
+

Indicative timeline :

3-5 years
Long term
Continuous
Long term
1-3 years

Stakeholders :

Private companies / DFI
ERERA / DFI
WAPP / ECREEE
DFI / International investors
ECOWAS / DFI / IMF /
Supervising Ministry


Final version

10. Development of a grid code facilitating the optimization of the energy system	+	1-3 years	WAPP / DFI / APUA
14. Implementation of customer management software and call centers	++	1-3 years	Private companies
15. Implementation of prepaid meters and decentralization of invoice and bill collection activities	++	1-5 years	DFI

Activities already undertaken :

- The restoration of a board of directors and the implementation of a management contract, as discussed with the World Bank as part of the additional financing of the "Emergency water and electricity services upgrading project" project
- The short-term development of new production capacity to replace the expensive capacity lease
- The development of a low-cost production plan in partnership with the World Bank, considering the development of hydropower potential and importation from the OMVG loop
- Several projects to strengthen distribution networks
- In support of the draft management contract, funding was mobilized by the World Bank to:
 - the continuation of the census of consumers;
 - the purchase and installation of new prepayment meters;
 - the acquisition of a new customer management software;
 - the creation of a new call center;
 - Training of EAGB staff.

LEC - Liberia

LEC – Liberia 			
<u>Critical factors identified:</u> <p>7. Regulatory and institutional framework inadequate for the efficient participation of the private sector</p> <p>18. Consumption of end customers poorly apprehended</p> <p>19. Chain of revenue collection to improve</p> <p>21. Absence of customer service</p>			
<u>Adapted actions:</u> <p>1. Appropriate use of management contracts</p> <p>3. Reorganization of utilities' structures to better match the market</p> <p>7. Diversification of project implementation schemes and definition of a portfolio of sovereign guarantees</p> <p>12. Activity-based costing and an annual financial statements audits to improve transparency</p> <p>14. Implementation of customer management software and call centers</p> <p>15. Implementation of prepaid meters and decentralization of invoice and bill collection activities</p>	<u>Budget :</u> <p>++</p> <p>+ / ++</p> <p>+</p> <p>+</p> <p>++</p> <p>++</p>	<u>Indicative timeline :</u> <p>3-5 years</p> <p>1-5 years</p> <p>1-3 years</p> <p>1-3 years</p> <p>1-3 years</p> <p>1-5 years</p>	<u>Stakeholders :</u> <p>Private companies / DFI</p> <p>Utilities / APUA</p> <p>ECOWAS / DFI / IMF / Supervising Ministry</p> <p>Court of Audit / ECOWAS</p> <p>Private companies</p> <p>DFI</p>

16. Technical and legal support to be strengthened by DFIs	-	Continuous	DFI
<p><u>Activities already undertaken :</u></p> <p>Setting up a regulator</p> <ul style="list-style-type: none"> • The establishment of an independent regulator is one of the priority reforms of recent years. The regulator's mandate is to increase the solvency of the sector, to allow market reforms (development of PPPs) and to facilitate the participation of private investors in the development of energy production projects. <p>Energy imports and hydropower development</p> <ul style="list-style-type: none"> • Imports from the CLSG interconnection and the development of large hydroelectric facilities on the St. Paul River are expected to increase electricity supply and reduce operating costs. <p>LEC Management Contract and Operational Improvement</p> <ul style="list-style-type: none"> • The following actions are planned to be implemented: • Implementation of a modern information management system for billing and collection • Upgrading the customer service call center 			

EDM-SA - Mali

EDM-SA – Mali			
<p>Critical factors identified:</p> <ul style="list-style-type: none"> 3. Supply-demand deficit compensated with expensive emergency solutions 9. Weak financial health of utilities 13. Network management to strengthen 14. Suboptimal maintenance of assets 17. Tariffs not reflecting the real costs of the sector 			
<p>Adapted actions:</p> <ul style="list-style-type: none"> 2. Reinforcement of the regulator's role and its prerogatives on electricity tariff mechanisms 4. Capitalization of the ICC and improve dispatching procedures 5. Harmonization of master plans, strategic plans and roadmaps 6. Extension and strengthening of networks and interconnections as a determinant of the system's performance 10. Development of a grid code facilitating the optimization of the energy system 11. Financial restructuring of utilities 	<p>Budget :</p> <ul style="list-style-type: none"> + - - +++ + ++ 	<p>Indicative timeline :</p> <ul style="list-style-type: none"> Long term Long term Continuous Long term 1-3 years 1-5 years 	<p>Stakeholders :</p> <ul style="list-style-type: none"> ERERA / DFI WAPP WAPP / ECREEE DFI / International investors WAPP / DFI / APUA IMF / Supervising Ministry

Activities already undertaken :

In order to address all these difficulties, EDM launched a Plan Director Production - Transport - Distribution of Bamako over the period 2018-2040. The implementation of this ambitious plan will have undergone a rigorous monitoring and follow-up.

The State of Mali also conducted a clearance of accounts of the EDM to give a second wind to deal with its challenges.

NIGELEC - Niger

NIGELEC – Niger



Critical factors identified:

1. Sectoral governance often problematic
5. Distribution networks undermaintained and relatively limited
6. Energy mix little diversified
7. Regulatory and institutional framework inadequate for the efficient participation of the private sector
9. Weak financial health of utilities
13. Network management to strengthen
20. Commercial basis of cross-border exchanges of electricity to be strengthened

Adapted actions:

2. Reinforcement of the regulator's role and its prerogatives on electricity tariff mechanisms
4. Capitalization of the ICC and improve dispatching procedures
5. **Harmonization of master plans, strategic plans and roadmaps**
6. **Extension and strengthening of networks and interconnections as a determinant of the system's performance**
7. Diversification of project implementation schemes and definition of a portfolio of sovereign guarantees

Budget :

+

-

-

+++

+

Indicative timeline :

Long term

Long term

Continuous

Long term

1-3 years

Stakeholders :

ERERA / DFI

WAPP


WAPP / ECREEE

DFI / International investors


ECOWAS / DFI / IMF /
Supervising Ministry

8. Enhancement of clearness in procurement procedures	+	1-3 years	DFI / Supervising Ministry
10. Development of a grid code facilitating the optimization of the energy system	+	1-3 years	WAPP / DFI / APUA
11. Financial restructuring of utilities	++	1-5 years	IMF / Supervising Ministry
12. Activity-based costing and an annual financial statements audits to improve transparency	+	1-3 years	Court of Audit / ECOWAS
13. Standardization of import / export contractual clauses to facilitate trades	-	1-3 years	WAPP
16. Technical and legal support to be strengthened by DFIs	-	Continuous	DFI
<p><u>Activities already undertaken :</u></p> <p>Today Niger has undertaken a transformation in its electricity sector. This approach will result in many institutional and legislative reforms, including the new Code of electricity.</p> <p>The aim is the liberalisation of the sector of production and distribution of energy electric all-in-now a strong role of the State on different missions.</p>			

NBET - Nigeria

NBET – Nigeria			
			
<u>Critical factors identified:</u>			
2. Areas of responsibilities sometimes unclear 9. Weak financial health of utilities 13. Network management to strengthen 14. Suboptimal maintenance of assets 17. Tariffs not reflecting the real costs of the sector 19. Chain of revenue collection to improve 20. Commercial basis of cross-border exchanges of electricity to be strengthened			
<u>Adapted actions:</u>	<u>Budget :</u>	<u>Indicative timeline :</u>	<u>Stakeholders :</u>
2. Reinforcement of the regulator's role and its prerogatives on electricity tariff mechanisms	+	Long term	ERERA / DFI
3. Reorganization of utilities' structures to better match the market	+ / ++	1-5 years	Utilities / APUA
13. Standardization of import / export contractual clauses to facilitate trades	-	1-3 years	WAPP
<u>Activities already undertaken :</u>			
In order to tackle the technical issues through the electricity value chain, investment plan in power generation, transmission and distribution of electricity are intended in the Road Map for the Power Sector Reform. Moreover, a major development plan was launched on T&D sector financed by DFI. The Transmission Company of Nigeria has developed a new TSO development plan that covers the period of 2017-2032.			

TCN - Nigeria

TCN – Nigeria			
			
<u>Critical factors identified:</u> <ul style="list-style-type: none"> 2. Areas of responsibilities sometimes unclear 9. Weak financial health of utilities 13. Network management to strengthen 14. Suboptimal maintenance of assets 17. Tariffs not reflecting the real costs of the sector 19. Chain of revenue collection to improve 20. Commercial basis of cross-border exchanges of electricity to be strengthened 			
<u>Adapted actions:</u> <ul style="list-style-type: none"> 2. Reinforcement of the regulator's role and its prerogatives on electricity tariff mechanisms 3. Reorganization of utilities' structures to better match the market 4. Capitalization of the ICC and improve dispatching procedures 6. Extension and strengthening of networks and interconnections as a determinant of the system's performance 10. Development of a grid code facilitating the optimization of the energy system 	<u>Budget :</u> <ul style="list-style-type: none"> + + / ++ - +++ + 	<u>Indicative timeline :</u> <ul style="list-style-type: none"> Long term 1-5 years Long term Long term 1-3 years 	<u>Stakeholders :</u> <ul style="list-style-type: none"> ERERA / DFI Utilities / APUA WAPP DFI / International investors WAPP / DFI / APUA


11. Financial restructuring of utilities	++	1-5 years	IMF / Supervising Ministry
13. Standardization of import / export contractual clauses to facilitate trades	-	1-3 years	WAPP

Activities already undertaken :

In order to tackle the technical issues through the electricity value chain, investment plan in power generation, transmission and distribution of electricity are intended in the Road Map for the Power Sector Reform. Moreover, a major development plan was launched on T&D sector financed by DFI.

The Transmission Company of Nigeria has developed a new TSO development plan that covers the period of 2017-2032.

SENELEC - Senegal

SENELEC – Senegal 			
<u>Critical factors identified:</u> 4. Transmission lines under development 11. Capacity for contract arrangement and contract management to build 19. Chain of revenue collection to improve			
<u>Adapted actions:</u> 5. Harmonization of master plans, strategic plans and roadmaps 6. Extension and strengthening of networks and interconnections as a determinant of the system's performance 13. Standardization of import / export contractual clauses to facilitate trades 15. Implementation of prepaid meters and decentralization of invoice and bill collection activities 16. Technical and legal support to be strengthened by DFIs 17. Technical and contractual capacities to be strengthened through the regional university network	<u>Budget :</u> - +++ - ++ - +	<u>Indicative timeline :</u> Continuous Long term 1-3 years 1-5 years Continuous Continuous	<u>Stakeholders :</u> WAPP / ECREEE DFI / International investors WAPP DFI DFI WAPP / APUA
<u>Activities already undertaken :</u> Presence of the IPPs The presence of IPP in Senegal is important, whether for fuel production or, in recent years, for coal projects and solar. The financial credibility of SENELEC, the single buyer, is essential to attract private investment.			

Diversification of sources and development of renewable energy

The diversification of energy sources through a strategy properly established and supported through incentives for renewable energy, as much for the large projects of self-production.

The obligation of connection and tariff for renewable energy to ensure a certain financial viability of private investors, including through compensation. If public authorities support is present, redemption rates are still considered too low.

Setting and rural electrification in concession

In terms of rural electrification, positive returns are observed on the concession layouts. The grant provided by the public authorities and the obligation of performance (in terms of the number of connection) have been beneficial.

Development of SENELEC

The Yeesal 2020 strategic plan is ambitious. The success of the bond issue launched beginning 2018 will be a sign of the confidence of savers and investors in SENELEC.

Moreover, this plan will undergo a steering and a rigorous follow-up given its scale: it concerns all aspects of the company (technical, human, commercial and financial).

EDSA – Sierra Leone

EDSA – Sierra Leone



Critical factors identified:

- 3. Supply-demand deficit compensated with expensive emergency solutions
- 4. Transmission lines under development
- 5. Distribution networks undermaintained and relatively limited
- 7. Regulatory and institutional framework inadequate for the efficient participation of the private sector
- 17. Tariffs not reflecting the real costs of the sector
- 18. Consumption of end customers poorly apprehended
- 19. Chain of revenue collection to improve
- 21. Absence of customer service

Adapted actions:

- 5. **Harmonization of master plans, strategic plans and roadmaps**
- 6. **Extension and strengthening of networks and interconnections as a determinant of the system's performance**
- 7. Diversification of project implementation schemes and definition of a portfolio of sovereign guarantees
- 8. Enhancement of clearness in procurement procedures

Budget :

-
+++
+
+

Indicative timeline :

Continuous
Long term
1-3 years
1-3 years

Stakeholders :

WAPP / ECREEE
DFI / International investors
ECOWAS / DFI / IMF /
Supervising Ministry
DFI / Supervising Ministry

12. Activity-based costing and an annual financial statements audits to improve transparency	+	1-3 years	Court of Audit / ECOWAS
14. Implementation of customer management software and call centers	++	1-3 years	Private companies
15. Implementation of prepaid meters and decentralization of invoice and bill collection activities	++	1-5 years	DFI
16. Technical and legal support to be strengthened by DFIs	-	Continuous	DFI

Activities already undertaken :

The Electricity Distribution and Supply Authority (EDSA) has defined an action plan to tackle its difficulties and more generally the ones of the electricity sector. These actions are the followings:

- Reduce commercial loss
- Enforce anti-theft policy including penalty payment
- Improve collection efficiency
- Strengthen operations and fault repair
- Develop technical loss reduction investment program
- Adjust connection fees to deep charge cost recovery level

CEET - Togo

CEET – Togo



Critical factors identified:

- 6. Energy mix little diversified
- 9. Weak financial health of utilities
- 13. Network management to strengthen
- 17. Tariffs not reflecting the real costs of the sector
- 19. Chain of revenue collection to improve

Adapted actions:

- 1. **Appropriate use of management contracts**
- 2. Reinforcement of the regulator's role and its prerogatives on electricity tariff mechanisms
- 4. Capitalization of the ICC and improve dispatching procedures
- 5. Harmonization of master plans, strategic plans and roadmaps
- 10. **Development of a grid code facilitating the optimization of the energy system**
- 11. **Financial restructuring of utilities**
- 15. **Implementation of prepaid meters and decentralization of invoice and bill collection activities**

Budget :

++
+
-
-
+
++
++

Indicative timeline :

3-5 years
Long term
Long term
Continuous
1-3 years
1-5 years
1-5 years

Stakeholders :

Private companies / DFI
ERERA / DFI
WAPP
WAPP / ECREEE
WAPP / DFI / APUA
IMF / Supervising Ministry
DFI

Activities already undertaken :

Under pricing

Regarding the price of the electricity service, the Government of Togo decided to increase prices to consumers in March 2017.

Strong dependence on imports

On the dependence of Togo to imports, the Government of Togo has decided to reduce the share of imports and increase the Contour Global plant from 2016. This action helps to strengthen domestic production in the mix but occurred relatively abruptly from the point of view of the CEB and its commitments to its exporters.

At the helm of the Energy Transition, Tractebel provides a full range of engineering and consulting services throughout the life cycle of its clients' projects, including design and project management. As one of the world's largest engineering consultancy companies and with more than 150 years of experience, it's our mission to actively shape the world of tomorrow. With about 4,400 experts and offices in 33 countries, we are able to offer our customers multidisciplinary solutions in energy, water and infrastructure.

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