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Report No: PAD3780

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A PROPOSED CREDIT
IN THE AMOUNT OF EUR 271.3 MILLION
(US\$295.0 MILLION EQUIVALENT)

TO THE
REPUBLIC OF CAMEROON

AND

ON A PROPOSED GRANT
IN THE AMOUNT OF SDR 65.9 MILLION
(US\$90.0 MILLION EQUIVALENT)

TO THE
REPUBLIC OF CHAD

FOR THE

CAMEROON - CHAD POWER INTERCONNECTION PROJECT

May 26, 2020

Energy and Extractives Global Practice
Africa Region

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CURRENCY EQUIVALENTS

(Exchange Rate Effective April 30, 2020)

Currency Unit =	SDR, Euros and XAF
US\$1 =	0.919 Euros
US\$1 =	SDR 0.732
US\$1 =	XAF 599.20

FISCAL YEAR

January 1 - December 31

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ABBREVIATIONS AND ACRONYMS

ADERM	Energy Efficiency and Renewable Energy Agency
AER	<i>Agence pour l'Électrification Rurale</i> (Rural Electrification Agency in Cameroon)
AES	American Electricity Supply Corporation
AfDB	African Development Bank
ARSE	Electricity Sector Regulatory Entity
ARSEL	<i>Agence de Régulation du Secteur de l'Électricité</i> (Electricity Regulator in Cameroon)
CAA	<i>Caisse Autonome d'Amortissement</i> (Autonomous Amortization Funds)
CAN	<i>Coupe Africaine des Nations</i> (Africa Cup of Nations)
CAPEX	Capital Cost
CAPP	Central African Power Pool
CCB	Climate Co-benefits
CdP	<i>Comité de Pilotage</i> (Steering Committee)
CEMAC	<i>Communauté Economique et Monétaire de l'Afrique Centrale</i> (Economic and Monetary Community of Central Africa)
COE	Common Owner's Engineer
COVID-19	Coronavirus Disease
CNPC	China National Petroleum Corporation
CPF	Country Partnership Framework
CT	<i>Comité Technique Cameroon-Tchad</i> (Technical Steering Committee)
DA	Designated Account
DFI	Development Financial Institution
DFIL	Disbursement and Financial Information Letter
DL	Disbursement Letter
DPF	Development Policy Financing
DSCE	<i>Document de Stratégie pour la Croissance et l'Emploi</i> (Growth and Employment Strategy Paper)
EAPP	Eastern Africa Power Pool
ECCAS	Economic Community of Central Africa States
EDC	Electricity Development Corporation
EHS	Environmental, Health and Safety
EIRR	Economic Internal Rate of Return
ENEO	Energy of Cameroun
EPC	Engineering, Procurement and Construction
ERP	Enterprise Resource Planning
ES	Environmental Specialist
ESDP	Energy Sector Development Project
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ETRP	Electricity Transmission and Reform Project
EU	European Union
FDI	Foreign Direct Investment



FM	Financial Management
FMS	Financial Management Specialist
FY	Fiscal Year
GBV/SEA	Gender Based Violence/Sexual Harassment and Abuse
GDP	Gross Domestic Product
GEMS	Geo Enabling Monitoring System
GHG	Greenhouse Gas
GIS	Geospatial Information System
GoC	Government of Cameroon
GoRC	Government of the Republic of Chad
GRM	Grievance Redress Mechanism
GW	Gigawatt
GWh	Gigawatt Hours
HCI	Human Capital Index
HDI	Human Development Index
HFO	Heavy-fuel Oil
HPP	Hydro Power Plant
HV	High-voltage
IBRD	International Bank for Reconstruction and Development
IDF	Institutional Development Fund
IFC	International Finance Corporation
IFRs	Interim Financial Reports
IMF	International Monetary Fund
INDCs	Initial Nationally Determined Commitments
IPF	Investment Project Financing
IPP	Independent Power Producer
IUCN	International Union for Conservation of Nature
KPIs	Key Performance Indicators
kWh	Kilowatt-Hour
LFO	Light-fuel Oil
M&E	Monitoring and Evaluation
MFD	Maximizing Finance for Development
MIGA	Multilateral Investment Guarantee Agency
MINEE	Ministry of Energy and Water
MINEPDED	Ministry of Environment, Nature Protection and Sustainable Development
MINMAP	<i>Ministère des Marchés Publics</i> (Ministry of Public Procurement)
MPE	Ministry of Petroleum and Energy
MV	Medium-voltage
MW	Megawatt
MWh	Megawatt Hour
NGO	Non-governmental Organizations
NPF	New Procurement Framework
NPV	Net Present Value
O&M	Operation and Maintenance



OE	Owner's Engineer
OHS	Occupational, Health and Safety
OPEX	Operating Cost
OPGW	Optical Ground Wire
PAP	Project-Affected People
PC	Project Coordinator
PDO	Project Development Objective
PDSE	<i>Plan de Développement du Secteur de l'Electricité</i> (Least Cost Power Sector Expansion Development Plan)
PESIA	Preliminary Environmental and Social Impact Assessment
PFM	Public Financial Management
PIM	Project Implementation Manuals
PIU	Project Implementation Unit
PMS	Project Management Support
PPA	Power Purchase Agreement
PPPs	Public-Private Partnerships
PPSD	Project Procurement Strategies for Development
PS	Procurement Specialist
PV	Photovoltaics
RAP	Resettlement Action Plan
REAPUR	Rural Electricity Access Project for Underserved Regions
RIE	<i>Reseau Interconnecté Est</i> (Eastern Interconnected Network)
RIN	<i>Reseau Interconnecté Nord</i> (Northern Interconnected Network)
RIS	<i>Reseau Interconnecté Sud</i> (Southern Interconnected Network)
ROGEP	Regional Off-Grid Regional Electrification Project
RPF	Resettlement Policy Framework
RPPs	Revenue Protection Programs
SAPP	Power Pool for a Southern African Power Pool
SCADA	Supervisory Control and Data Acquisition
SCD	Systematic Country Diagnostic
SCMS	Substation Control and Monitoring System
SDG	Sustainable Development Goal
SDR	Special Drawing Rights
SDS	Social Development Specialist
SNE	<i>Société Nationale d'Electricité du Tchad</i> (Chad's National Electricity Utility)
SoE	Statement of Expenditure
SONATREL	<i>Société Nationale du Transport de l'Électricité du Cameroun</i> (National Transmission Company)
SONEL	<i>Société Nationale d'Électricité</i> (Integrated Power Utility)
SPV	Special Purpose Vehicle
SSA	Sub-Saharan Africa
STEP	Systematic Tracking of Exchanges in Procurement
ToR	Terms of Reference
TSA	Transmission Service Agreements



TSO	Transmission System Operator
UNDP	United Nations Development Program
WAPP	West Africa Power Pool
WBG	World Bank Group
WTP	Willingness to Pay



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DATASHEET

BASIC INFORMATION

Country(ies)	Project Name	
Cameroon, Chad	Cameroon - Chad Power Interconnection Project	
Project ID	Financing Instrument	Environmental Assessment Category
P168185	Investment Project Financing	A-Full Assessment

Financing & Implementation Modalities

<input type="checkbox"/> Multiphase Programmatic Approach (MPA)	<input type="checkbox"/> Contingent Emergency Response Component (CERC)
<input type="checkbox"/> Series of Projects (SOP)	<input checked="" type="checkbox"/> Fragile State(s)
<input type="checkbox"/> Performance-Based Conditions (PBCs)	<input type="checkbox"/> Small State(s)
<input type="checkbox"/> Financial Intermediaries (FI)	<input checked="" type="checkbox"/> Fragile within a non-fragile Country
<input type="checkbox"/> Project-Based Guarantee	<input type="checkbox"/> Conflict
<input type="checkbox"/> Deferred Drawdown	<input type="checkbox"/> Responding to Natural or Man-made Disaster
<input type="checkbox"/> Alternate Procurement Arrangements (APA)	

Expected Approval Date	Expected Closing Date
16-Jun-2020	31-Dec-2027

Bank/IFC Collaboration

No

Proposed Development Objective(s)

The Project Development Objective is to : (i) interconnect the Southern and Northern power systems of Cameroon; (ii) enable electricity trade between Cameroon and Chad; and (iii) increase access to electricity in the Chad capital city of N’Djamena.



Components

Component Name	Cost (US\$, millions)
Cameroon RIS-RIN Interconnection	375.00
Cameroon-Chad Interconnection	328.00
Electricity access in Chad	41.00

Organizations

Borrower: Republic of Cameroon
 Republic of Chad
 Implementing Agency: SONATREL
 SNE

PROJECT FINANCING DATA (US\$, Millions)

SUMMARY

Total Project Cost	744.00
Total Financing	744.00
of which IBRD/IDA	385.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Development Association (IDA)	385.00
IDA Credit	295.00
IDA Grant	90.00

Non-World Bank Group Financing

Counterpart Funding	93.50
Borrower/Recipient	93.50
Other Sources	265.50



African Development Bank	265.50
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IDA Resources (in US\$, Millions)

	Credit Amount	Grant Amount	Guarantee Amount	Total Amount
Cameroon	295.00	0.00	0.00	295.00
National PBA	100.00	0.00	0.00	100.00
Regional	195.00	0.00	0.00	195.00
Chad	0.00	90.00	0.00	90.00
National PBA	0.00	30.00	0.00	30.00
Regional	0.00	60.00	0.00	60.00
Total	295.00	90.00	0.00	385.00

Expected Disbursements (in US\$, Millions)

WB Fiscal Year	2020	2021	2022	2023	2024	2025	2026	2027
Annual	0.00	10.75	10.75	38.50	89.80	141.10	89.80	4.30
Cumulative	0.00	10.75	21.50	60.00	149.80	290.90	380.70	385.00

INSTITUTIONAL DATA**Practice Area (Lead)**

Energy & Extractives

Contributing Practice Areas**Climate Change and Disaster Screening**

This operation has been screened for short and long-term climate change and disaster risks

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	● High
2. Macroeconomic	● High



3. Sector Strategies and Policies	● High
4. Technical Design of Project or Program	● Substantial
5. Institutional Capacity for Implementation and Sustainability	● High
6. Fiduciary	● High
7. Environment and Social	● High
8. Stakeholders	● Substantial
9. Other	● High
10. Overall	● High

COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

Yes No

Does the project require any waivers of Bank policies?

Yes No

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	✓	
Performance Standards for Private Sector Activities OP/BP 4.03		✓
Natural Habitats OP/BP 4.04	✓	
Forests OP/BP 4.36	✓	
Pest Management OP 4.09		✓
Physical Cultural Resources OP/BP 4.11	✓	
Indigenous Peoples OP/BP 4.10		✓
Involuntary Resettlement OP/BP 4.12	✓	
Safety of Dams OP/BP 4.37		✓
Projects on International Waterways OP/BP 7.50		✓



Projects in Disputed Areas OP/BP 7.60



Legal Covenants

Sections and Description

Section I.C.9 of Schedule 2 of Financing Agreement with Cameroon: The Recipient shall ensure, and cause SONATREL to ensure that, not later than three (3) months after the Effective Date, a biodiversity specialist is recruited to the SONATREL PIU, under terms of reference and with qualifications and experience satisfactory to the Association, thereafter maintained throughout Project implementation, to ensure the appropriate management and monitoring of the potential Project-related biodiversity impacts, in accordance with the Safeguard Instruments and to prepare a wildlife corridor management plan and/or a biodiversity management plan for Part 1.A of the Project.

Sections and Description

Section I.D of Schedule 2 of Financing Agreement with Cameroon: The Recipient shall: (i) establish, and cause SONATREL to establish, not later than six (6) months after the Effective Date; and (ii) thereafter maintain, operate and publicize the availability of, and cause SONATREL to maintain, operate and publicize the availability of, throughout Project implementation, a functional grievance redress mechanism for Parts 1, 2.A, 2.B, 2.D and 2.G of the Project, with adequate staffing and processes, and in form and substance satisfactory to the Association, to register, hear and determine fairly and in good faith all complaints raised in relation to Parts 1, 2.A, 2.B, 2.D and 2.G of the Project, and take all measures necessary to implement the determinations made by such mechanism in a manner satisfactory to the Association.

Sections and Description

Section I.E of Schedule 2 of Financing Agreement with Cameroon: The Recipient shall, not later than six (6) months after the Effective Date, submit to the Association the signed term sheet for the sale of electricity from Cameroon to Chad incorporating any comments previously provided by the Association.

Sections and Description

Section I.D of Schedule of Project Agreement with SONATREL: SONATREL shall: (i) not later than one (1) month after the Effective Date, adopt the Project Implementation Manual in form and substance satisfactory to the Association.

Sections and Description

Section I.A of Schedule of Project Agreement with SONATREL: SONATREL shall take all measures required on its behalf to establish, not later than one (1) month after the Effective Date and thereafter maintain throughout Project implementation, under terms of reference and with a composition satisfactory to the Association, the Joint Technical Steering Committee. The JTSC shall be composed of the head of each of SONATREL and SNE, the Secretary General of the CAPP, and technical experts. The JTSC shall be responsible, in particular, for: (i) supervising the progress of the Project in the Participating Countries and the work of the SONATREL and the SNE PIU and reporting to the ISSC thereon; (ii) approving the Annual Work Plan and Budget; and (ii) addressing technical issues as they arise. The JTSC shall meet at least quarterly each year during Project implementation or more often as warranted to ensure the timely implementation of the Project.

Sections and Description



Section I.G of Schedule of Project Agreement with SONATREL: SONATREL shall not later than one (1) month after the Effective Date: (i) adopt a financial procedures manual, in form and substance satisfactory to the Association, to which suitably reflects the specificities of the Project.

Sections and Description

Section I.A.1 of Schedule 2 of Financing Agreement with Chad: The Recipient shall establish, not later than twelve (12) months after the Effective Date, and thereafter maintain throughout Project implementation, under terms of reference and with a composition satisfactory to the Association, the Inter-State Steering Committee. The Inter-State Steering Committee shall function under the authority of the Recipient's Minister of Petroleum and Energy and its composition shall comprise representatives of the Ministry of Petroleum and Energy, of other relevant ministers, and of the power sector regulator. The ISSC shall be vested with the specific responsibility of providing guidance on strategic and policy issues and of resolving issues requiring government decision. For such purpose, the Inter-State Steering Committee shall meet as and when required, but at least once each year during Project implementation.

Sections and Description

Section I.E of Schedule 2 of Financing Agreement with Chad: The Recipient shall, not later than six (6) months after the Effective Date, submit to the Association the signed term sheet for the sale of electricity from Cameroon to Chad incorporating any comments previously provided by the Association.

Sections and Description

Section I.D of Schedule 2 of Financing Agreement with Chad: The Recipient shall: (i) establish, and cause SNE to establish, not later than six (6) months after the Effective Date; and (ii) thereafter maintain, operate and publicize the availability of, and cause SNE to maintain, operate and publicize the availability of, throughout Project implementation, a functional grievance redress mechanism for Parts 2.C, 2.E, 2.F, 2.H and 3 the Project, with adequate staffing and processes, and in form and substance satisfactory to the Association, to register, hear and determine fairly and in good faith all complaints raised in relation to Parts 2.C, 2.E, 2.F, 2.H and 3 of the Project, and take all measures necessary to implement the determinations made by such mechanism in a manner satisfactory to the Association.

Sections and Description

Section I.A.1 of Schedule 2 of Financing Agreement with Cameroon: The Recipient shall establish, not later than one (1) month after the Effective Date, and thereafter maintain throughout Project implementation, under terms of reference and with a composition satisfactory to the Association, the Inter-State Steering Committee. The Inter-State Steering Committee shall function under the authority of the Recipient's Minister of Water and Energy and its composition shall comprise representatives of the Ministry of Water and Energy, of other relevant ministers, and of the power sector regulator. The ISSC shall be vested with the specific responsibility of providing guidance on strategic and policy issues and of resolving issues requiring government decision. For such purpose, the Inter-State Steering Committee shall meet as and when required, but at least once each year during Project implementation.

Sections and Description

Section I.A.1 of Schedule to Project Agreement with SNE: SNE shall take all measures required on its behalf to establish, not later than one (1) month after the Effective Date and thereafter maintain throughout Project implementation, under terms of reference and with a composition satisfactory to the Association, the Joint Technical Steering Committee. The JTSC shall be composed of the head of each of SNE and SONATREL, the



Secretary General of the CAPP, and technical experts. The JTSC shall be responsible, in particular, for: (i) supervising the progress of the Project in the Participating Countries and the work of the SNE PIU and the SONATREL PIU and reporting to the ISSC thereon; (ii) approving the Annual Work Plan and Budget; and (iii) addressing technical issues as they arise. The JSC shall meet at least quarterly each year during Project implementation or more often as warranted to ensure the timely implementation of the Project.

Sections and Description

Section I.G of Schedule to Project Agreement with SNE: SNE shall, not later than six (6) months after the Effective Date: (i) adopt the unified financial management procedures manual in use for all IDA-financed projects implemented in Chad as adapted, in a manner satisfactory to the Association, to reflect the specificities of the Project; (ii) acquire and install a “multi-project” computerized accounting system to fit Project needs and generate useful information and financial statements and train SNE staff in the use thereof; and (iii) recruit an independent external auditor under terms of reference and with qualifications and experience satisfactory to the Association.

Sections and Description

Section I.G of Schedule of Project Agreement with SONATREL: SONATREL shall not later than three (3) months after the Effective Date: (A) customize and deploy the accounting software TOMPRO to handle accounting and reporting needs under the Project and train SONATREL staff in the use thereof; (B) recruit an accountant to be part of the SONATREL PIU, under terms of reference and with qualifications and experience satisfactory to the Association, and (C) operationalize its internal audit unit with adequate staff, working equipment, processes and procedures, and include the Project’s activities in its audit scope, with a clear reporting timeline, under terms and conditions satisfactory to the Association.

Sections and Description

Section I.A.2 of Schedule of Project Agreement with SNE: In order to ensure the effective supervision of the works and timely collaboration with the Recipient’s national authorities and SONATREL, SNE shall maintain throughout Project implementation, the SNE PIU within its structure under terms of reference satisfactory to the Association and with financial, technical and administrative resources adequate to enable it to carry out Parts 2.C, 2.E, 2.F, 2.H and 3 of the Project in a timely and diligent manner, including the employment of the Owner’s Engineer to be competitively hired by SNE to support it in the supervision of the cross-border interconnection line. The SNE PIU shall be: (i) headed at all times by a Project coordinator with qualifications and experience satisfactory to the Association and its composition shall include at all times experts in procurement, financial management, environmental and social development under terms of reference and with qualifications and experience satisfactory to the Association; and (ii) supplemented with the appointment or recruitment, as the case may be, not later than five (5) months after the Effective Date and under terms of reference and with qualifications and experience satisfactory to the Association, of a financial management specialist, an accountant, and an internal auditor.

Sections and Description

Section I.D of Schedule of Project Agreement with SNE: SNE shall: (i) not later than one (1) month after the Effective Date, adopt the Project Implementation Manual in form and substance satisfactory to the Association; (ii) thereafter, take all action required to carry out Parts 2.C, 2.E, 2.F, 2.H and 3 of the Project in accordance with the provisions and requirements set forth or referred to in the Project Implementation Manual; (iii) submit recommendations to the Association for its consideration for changes and further updates of the Project Implementation Manual as they may become necessary or advisable during Project implementation in order to



achieve the objectives of the Project; and (iv) not assign, amend, abrogate or waive the Project Implementation Manual or any of its provisions without the prior approval of the Association. Notwithstanding the foregoing, if any of the provisions of the Project Implementation Manual is inconsistent with the provisions of the Financing Agreement or of Agreement, the provisions of the Financing Agreement or of this Agreement, as the case may be, shall prevail and govern.

Conditions

Type	Description
Effectiveness	Financing Agreement with Cameroon; Article V, Section 5.01: SONATREL has established the SONATREL PIU through the competitive recruitment of the Project Coordinator, the procurement specialist, the financial management specialist, the environmental specialist, the social development specialist, the monitoring and evaluation specialist, the technical coordinator and two local office coordinators, all under terms of reference and with experience and qualifications satisfactory to the Association
Disbursement	Finance Agreement with Cameroon; Section III.B.1.of Schedule 2: under Category (1), until and unless the Recipient shall have appointed, under terms and conditions satisfactory to the Association, the signatories to the Power Purchase Agreement and the Transmission Service Agreement for electricity sales to Chad.
Effectiveness	Financing Agreement with Chad : Article V, section 5.01: SNE has signed a contract with a firm, under terms of reference acceptable to the Association, employing its consulting services for Project management support to provide the skills mix required for Project implementation, including procurement, financial management, environmental and social development expertise.
Disbursement	Finance Agreement with Chad; Section III.B.1.of Schedule 2: under Category (1)(a), until and unless: (i) SNE shall have prepared, publicly consulted upon, finalized, adopted and publicly disclosed in-country and in the Association’s website, in form and in substance satisfactory to the Association and in conformity with the provisions of Section I.C of Schedule 2 to this Agreement, the updated ESIA, ESMP and RAP for Parts 2.C, 2.E and 2.F of the Project; and (ii) SONATREL shall have prepared, publicly consulted upon, finalized, adopted and publicly disclosed in-country and in the Association’s website, in form and in substance satisfactory to the Association and in conformity with the provisions of Section I.C of Schedule 2 to the Cameroon Financing Agreement, the updated ESIA, ESMP and RAP for Parts 2.A, 2.B and 2.D of the Project.



I. STRATEGIC CONTEXT

1. **The proposed Project will finance the first high-voltage (HV) interconnector in Central Africa, enabling clean electricity supply available in the South of Cameroon to reach its northern regions and energy-starved Chad, and thereby allowing millions of people in both countries to have access to electricity.** The Project consists of three components: (i) the interconnection of the southern (*Reseau Interconnecte Sud*, RIS) and northern (*Reseau Interconnecte Nord*, RIN) transmission systems in Cameroon (RIS-RIN Interconnection), which will enable further development of the abundant hydropower potential concentrated in the south to feed demand in the north and electricity exports to Chad; (ii) co-financing of the Cameroon – Chad Interconnection Project financed by the African Development Bank (AfDB) to connect the power systems of the two countries and enable power trade between them; and (iii) reinforcement of Chad’s power network and electricity access expansion in and around N’Djamena. The Project will also constitute the first transmission backbone in Chad, thus supporting the development of its solar potential in the future, and will finance a program to improve the operational and commercial performance of Chad’s national electricity utility (*Société Nationale d’Electricité*, SNE), thus improving its credibility as off-taker of electricity imported from Cameroon. In 2017 AfDB approved a US\$316 million financing for the cross-border interconnector but could not reach effectiveness due to a financing gap of EUR 41 million in Chad. Unable to bridge such gap due to its fragile macroeconomic situation, the Government of the Republic of Chad (GoRC) resorted to the World Bank for grant funding, which forms part for the proposed Project.

2. **While sharing cultural and geopolitical ties, the countries of the Economic and Monetary Community of Central Africa (*Communauté Economique et Monétaire de l’Afrique Centrale*, CEMAC)¹ face significant challenges of security, fragility, poverty and development, which are bound to escalate in the aftermath of the coronavirus disease (COVID-19).** CEMAC comprises some of the world’s poorest and most vulnerable countries, including Central African Republic, Democratic Republic of Congo and Chad. In particular, the Lake Chad area, which is home to a sixth of Central Africa’s population, is characterized by extreme poverty², broken institutions, strong demographic growth and increasing fragility and vulnerability to climate change. Since 2009, the conflict generated by Boko Haram has compounded the fragile situation of the region and resulted in a humanitarian crisis with large-scale population displacement. Poverty levels in Central Africa are in stark contrast with the sub-region’s large resource endowments, with significant oil reserves, substantial mineral concentrations, and large hydropower potential. Because of the reliance on commodities, and especially oil, the region’s economy is highly vulnerable to shocks. A prolonged decrease in global oil commodity prices in the aftermath of COVID-19 can have an important impact on countries with a significant share of gross domestic product (GDP) generated from oil and commodities. In addition to the health hazard caused by the pandemic, Central Africa risks to fall into a spiral of escalating poverty and violence if the health crisis fosters a full-blown economic crisis in the region.

3. **While Northern Cameroon is an outlier nationally, Chad is a global outlier in terms of energy services, with among the lowest access rates in the world, limited power supply, and very high costs for those households that rely on liquid fuels for energy services.** Despite the endowment of fossil fuels and solar resources at the national level, and endowment of hydropower resources at the regional level, Chad has among the lowest rate of access to electricity in the world at eight percent (against an Sub-Saharan Africa (SSA) average of 43 percent), with significant disparities between

¹ CEMAC is a customs and monetary union with six member states including: Gabon, Cameroon, the Central African Republic, Chad, the Republic of Congo, Equatorial Guinea.

² The proportion of population in CEMAC countries below the international poverty line of US\$1.90 per day (in 2011 purchasing power parity terms) was 32.7 percent in 2016. Source: International Monetary Fund (IMF), Central African Economic and Monetary Community, IMF Country Report No. 17/389, Dec. 2017



urban and rural areas (20 percent urban, 5 percent rural), and end-user tariffs that are among the highest in the world, but yet significantly below the cost of service, with a poor quality of service. Northern Cameroon is an outlier nationally, as the area of coverage³ is about 47 percent compared with 74 percent nationally, with access rates estimated at two thirds of the coverage rate (around 31 percent). As a result, the power sector presents two sources of fiscal impacts: a fiscal impact in Chad due to the quasi-fiscal deficit and actual budget transfers to SNE, and an indirect impact in both Chad and Northern Cameroon, with poor economic diversification due to lack of electricity, and poor reliability and high costs for those that have access – which hampers economic growth.

4. Low access to electricity entrenches fragility and represents a key challenge considering insecurity levels in the region. Impacts are multiple: (i) at the economic level, communities encounter difficulties in operating businesses and generating an income, which impedes efforts towards poverty reduction; (ii) at the security level, it renders the local population more vulnerable to security threats in times of increasing criminality and violence, notably in border areas subjected to the circulation of armed groups, and constitutes a pull factor for communities and youth to engage in illegal trade as a way to compensate for the lack of revenues and access to energy sources; (iii) at the social level, energy poverty and inequality in access make it more difficult for countries to achieve socio-economic targets in health and education, and to realize the full potential of human capital, and it increases their vulnerability to climate change⁴, natural disasters and pandemics, as energy is an important input for water, sanitation, broadband, as well as economic activity; and (iv) at the institutional level, operating administrative services and service delivery become more difficult, deepening further the existing gaps of socio-economic development between regions, which constitute a driver of conflict. In addition, women and girls, especially in rural areas, bear a significant burden as a result of the lack of energy access. Time spent on household chores, such as collecting firewood and water for drinking and burning high-polluting charcoal and kerosene for cooking and lighting, prevents their full and active participation in educational and economic activities.

5. The Project will materially support poverty reduction efforts, resilience and job growth, and in the medium-term of the recovery phase from COVID-19, it would create the fiscal space needed for job creation and economic growth, while improving the resilience of communities to shocks arising from climate change and pandemics. Access to expanded, reliable and more cost-efficient electricity is critical to enable the delivery of basic social services, such as health and education, and support the economic rebound of developing countries in the aftermath of the pandemic. In addition, increased access to electricity is deemed to be an effective strategy to enhance the resilience of host communities to climate change and pandemics, such as COVID-19⁵. Cameroon and Chad make no exceptions. The Project has several benefits. First, Cameroon will be able to pool the abundant hydropower capacity concentrated in the southern regions to serve demand in the North, where people and firms lack electricity due to inadequate and costly diesel-based generation. This will complement the Cameroon Rural Electricity Access Project for Underserved Regions (REAPUR – P163881) approved in June 2018, by ensuring power supply to the distribution network being constructed. Secondly, the more cost-effective energy mix nationally and hard currency revenues from electricity exports will help improve the financial standing of Cameroon's electricity sector and allow for the fiscal space needed to push economic rebound and job creation. Thirdly, electricity imports from Cameroon will help expand access to reliable electricity in Chad at an affordable price. This will be paramount to lift Chad's fragile circumstances and increase social and economic resilience, while providing fiscal space needed for alleviating COVID-19 impact. The cross-border interconnection will be associated with electrification of rural localities along its corridor, which traverse areas in North of Cameroon and Chad vulnerable to extreme poverty, instability and terrorism. Cameroon and Chad have clearly affirmed the political

³ Electricity coverage rate is the number of people living in electrified villages / total number of people.

⁴ World Bank, 2018. Lifelines, the Resilient Infrastructure Opportunity, Global Facility for Disaster Reduction and Recovery (GFDRR)

⁵ World Bank 2018.



importance attached to the proposed Project as a mean to stabilize the areas along the border and consolidate their collaboration towards peace and economic integration.

6. **Increasing regional energy integration is particularly important to support growth and resilience in Central Africa and notably in the Lake Chad area.** By pooling their more cost-efficient energy sources, countries across SSA could save more than US\$40 billion⁶ in capital spending or nearly US\$10 billion per year by 2040 to the African consumers, as the levelized cost of energy would fall from US\$70 to US\$64 per megawatt hour (MWh). Promoting regional interconnections not only allows for an increase in the total electricity supplied at a cheaper average cost but also diversifies the sources of electricity, which in turn increases the system reliability and grid stability. This is especially important in Central Africa, which is endowed with massive hydro potential, but this remains mostly unharnessed because of the concentration of resources in a few countries and their distance from centers of demand. The Lake Chad area stands to benefit the most from expanded electricity supply at lower costs. While the economic benefits of regional integration are well established, strong institutions, enabling infrastructure and consistent political will is required to ensure that the benefits materialize. The Project will provide Central Africa with its first transmission backbone, and, as such, its significance will span beyond Cameroon and Chad, providing lessons and incentives to other countries that may well benefit from power trade, and eventually driving political will and consensus towards regional power system integration.

7. **The Project will contribute to the Sahel Alliance's efforts to accelerate development outcomes and reduce drivers of fragility.** As a response to security and development challenges, an initiative called "Alliance for the Sahel" was launched in 2017 by France, Germany and the European Union (EU), with the United Nations Development Program (UNDP), AfDB and the World Bank Group (WBG) as founding partners.⁷ The initiative was announced in Paris on June 13, 2017, by France's President Macron, Germany's Chancellor Merkel, and the EU's High Representative Mogherini. The Alliance has been put together in consultation with the G5 countries (namely Mali, Chad, Niger, Burkina Faso, and Mauritania), which have endorsed the concept, priority areas and flagship projects. The aim of the Alliance is to accelerate results and crowd-in development resources to the Sahel to help countries address the multi-faceted challenges and drivers of fragility that affect them and promote increased resilience and economic opportunities, with a focus on the most vulnerable. One of the key objectives of the Sahel Alliance is to double access to electricity within five years (between 2018 and 2023) in the G5 countries. The Chad-Cameroon Interconnector is one of the flagship projects of the Sahel Alliance.

A. Country Context

Cameroon

8. **Despite the country's abundant natural resources and middle-income status, poverty remains widespread in Cameroon and the divide between the richer South and the poorer North feeds inequality and social tensions.** With a surface of 475,400 km² and a population of 25.2 million people in 2018, Cameroon is a medium-sized country, endowed with vast natural resources including oil, gas, minerals, agricultural land and forests. While the GDP per capita of US\$1,527 attests to Cameroon's lower-middle-income status, the country ranked 133rd out of 157 countries on the 2018 Human Capital Index (HCI). Poverty remains high (the poverty headcount rate was at 37.5 percent in 2014) and is concentrated in rural areas, where 90 percent of the poor live. Furthermore, the northern and far-northern regions severely lag behind. Approximately 56 percent of the poor population, equal to 4.5 million Cameroonians, resides in the North of the country

⁶ Castellano, A., A. Kendall, M. Nikomarov, and T. Swemmer. 2015. "Brighter Africa: The Growth Potential of the Sub-Saharan Electricity Sector." McKinsey & Company.

⁷ <https://www.alliance-sahel.org/en/>



and poverty there has dramatically increased due to demographic pressure, while decreasing in the South. Cameroon's health and education indicators are closer to those of low-income economies, and they also present deep regional and rural-urban disparities. The unemployment rate rose from 3.8 percent in 2007 to 4.3 percent in 2014, driven by rising unemployment among young people and rural workers. About 90 percent of the employed population work in the informal sector. Moreover, Cameroon is increasingly vulnerable to instability and violence. Violence and attacks by the Boko Haram jihadist terrorist in Cameroon's northern and far-northern regions have displaced nearly 230,000 people, and a secessionist conflict in the Anglophone south-western and north-western regions affects about 17 percent of the population; both pose an ongoing security threat and inhibit economic activity.

9. **Reforms and investments in key economic sectors, including energy, are critically needed to facilitate economic diversification and promote more inclusive growth and human development.** Dependency on oil revenues has made Cameroon vulnerable to external shocks and weakened its macro-fiscal balance. The prolonged decline in oil prices since mid-2014, compounded by a declining production in the agriculture and service sectors, affected growth and eroded the tax base, at a time when security and infrastructure spending was increasing exponentially. As part of a region-wide economic recovery effort largely supported by development partners, Cameroon signed a three-year Extended Credit Facility (ECF) program with the IMF covering 2017-2020. Also, the World Bank provided a First and a Second Fiscal Consolidation and Inclusive Growth Development Policy Financing (DPF – P163657 and P166694) as part of a three-year DPF series. Overall, the broader multilateral and bilateral effort to support Cameroon amounts to US\$2 billion of financing over a three-year period. Cameroon's overarching development agenda is articulated in the country's Vision 2035, which envisages Cameroon's transformation into an emerging economy by 2035. The Government of Cameroon (GoC) adopted the Growth and Employment Strategy Paper (*Document de Stratégie pour la Croissance et l'Emploi*, DSCE) in 2010, which established a framework to implement Vision 2035 over the 2010–2020 period. While Vision 2035 and DSCE both stress the importance of a strong, diversified economy, Cameroon ranked 166th out of 190 countries in the 2019 Doing Business Index, and performed poorly on the 2017-18 Global Competitiveness Index, especially on indicators related to economic infrastructure. This signals a clear need for reforms geared towards improving the business climate, strengthening governance and making public spending efficient, as well as fiscal policies that specifically target the needs of the poor. Equally important are investments in basic infrastructure.

10. **Cameroon's medium-term favorable growth outlook is expected to deteriorate because of COVID-19 and a continued focus on reforms and infrastructure investments will be key to propel a rebound.** Driven by endogenous factors, and notably the large public works in preparation for the 2021 Africa Cup of Nations (*Coupe Africaine des Nations*, CAN), rising investment in the oil and gas sectors, higher levels of private consumption, and the strong performance of financial services, Cameroon's GDP growth rate rose to 3.9 percent in 2019. Also, the continued focus on fiscal consolidation brought down the fiscal deficit from 6.1 to 2.2 percent of GDP in just two years (from 2016 to 2018). The global slowdown associated with COVID-19 is expected to reduce demand for Cameroon's exports of oil and non-oil commodities, causing growth to ease to 3.1 percent in 2020 (Box 1). Also, the adverse effect of lower oil prices combined with continued pressures on security expenditure and the fiscal impact of the GoC's response to the COVID-19 pandemic are expected to widen the overall fiscal deficit to 2.4 percent of GDP in 2020. Additional financing needs may require increasing bilateral and multilateral concessional budget support. To mitigate these risks, further structural reforms are vital to improve the business environment, diversify the economy, and build resilience to external shocks. The increased clean electricity supply resulting from the large hydropower development will be a key growth driver. Measures to increase the productivity of food crops, and the projected recovery of cotton, banana and cocoa prices will also boost growth. GDP growth is expected to recover gradually to 3.5 percent in 2021 and 3.7 percent in 2022 driven by global recovery, improved electricity supply with the entry into service of new hydroelectric dams; but would remain 3 percent below potential over 2020-2022.



Box 1. Outlook on Macroeconomic Impact of COVID-19 in Cameroon

GDP growth is projected to ease to 3.1 percent in 2020 from 3.9 percent in 2019 mostly following the global slowdown that is expected to reduce demand for Cameroon's exports of oil and non-oil commodities (cocoa, timber, aluminium). Government's measures to prevent the spread of the corona virus, are expected to affect the domestic demand for services. GDP growth is expected to recover gradually to 3.5 percent in 2021 and 3.7 percent in 2022 driven by global recovery, and improved electricity supply with the entry into service of new hydroelectric dams; but would remain 3 percent below potential over 2020-2022.

Lower international oil prices are expected to affect Cameroon's fiscal position through lower fiscal revenues in 2020-2021. The adverse effect of lower oil prices combined with continued pressures on security expenditure and the fiscal impact of the Government's response to the corona virus pandemic would be only partially offset by the reduced burden on fuel subsidies, widening the overall fiscal deficit to 2.4 percent of GDP in 2020 from 2.2 percent of GDP in 2019. Continued tightened tax controls, improved recovery of arrears and reduction of tax expenditures are expected to drive down the fiscal deficit to 1.8 percent of GDP in 2022. The deficit is expected to be financed by domestic debt issuance, bilateral and external borrowing. Limited achievements in human development and slower than potential economic growth lead to a projection of very limited progress in poverty reduction. The modest rebound of economic growth expected in 2021 and 2022 would lead to a marginal decline in poverty with the share of the population living under US\$1.9/day reaching around 21.9 percent by 2022.

Risks and Challenges. Domestically, the violent conflict in the South-West and North-West regions remains the major source of social and economic risk. On the external side, delay in the recovery or further deterioration of economic activity in the Euro Area and China economies (first and second trading partners, representing 49.1 percent and 13.1 percent of total exports, respectively in 2014-2018) would further affect Cameroon's external position. Under a downside scenario of a drop of oil price, from US\$30 per barrel to US\$27 per barrel in 2020 and from US\$39.8 to US\$31 in 2021, the current account deficit would widen by 0.2-0.6 percent of GDP in 2020 and 2021. The regional central bank current concerns about rebuilding its foreign exchange reserves and the possible adverse effects of the virus on the region's external position will limit the room for an easing in the monetary stance. Additional financing needs may require increasing bilateral and multilateral concessional budget support. To mitigate risks, further structural reforms are vital to improve the business environment, diversify the economy, and build resilience to external shocks as well as continued efforts in implementing the regional strategy defined by the CEMAC, including by complying with CEMAC's convergence criteria and foreign exchange regulations to rebuild fiscal and external buffers.

Chad

11. **Chad is a low-income fragile country with substantial and multifaceted development challenges.** Chad is one of the poorest and least developed countries in the world, ranking 187th out of 189 countries and territories on the Human Development Index (HDI) in 2018. It faces a difficult geographical and geopolitical environment; it is the 5th largest country in Africa, landlocked, crossed by the Sahara, prone to climate risks, and has a very low population density. The security and humanitarian situations are also challenging given the security tensions along the border areas, serious terrorist threats particularly in the Lake Chad region, and given that Chad hosts the largest number of refugees (on a per capita basis) in Africa.

12. **The effects of recession and austerity aggravated Chad's humanitarian challenge while constraining poverty reduction.** During the oil boom, poverty rates⁸ declined from 52 percent in 2003 to 39 percent in 2011. However, the absolute number of poor people increased from 4.9 million to 5.6 million due to population growth. Despite efforts to protect priority social and productive spending, dwindling fiscal resources and poor social spending execution have disrupted vital public services. Furthermore, insecurity in the sub-region resulted in an inflow of over 450,000 refugees, putting further pressure on tight fiscal balances and strained public service delivery. In the absence of a well-targeted and effective social safety net system, the poor and vulnerable have been deeply affected by the crisis, as well as by

⁸ US\$1.9 international line (estimated).



climate change impacts. As a result, poverty is estimated at 41 percent in 2019 affecting 6.4 million people, and it is concentrated in rural areas where the majority of the people live. Women continue to be disproportionately affected by poverty and systematically disadvantaged. The country currently ranks 187 out of 189 for the Gender Inequality Index with worsening trends in the past few years.

13. **By end 2019, Chad was gradually recovering from a severe economic and fiscal crisis caused by the 2014-2015 oil prices shock.** Growth stood at 2.6 percent in 2018 and is estimated at 3.2 percent (0.2 percent per capita) in 2019, mainly due to higher oil production and agricultural output (especially cotton). Although the negative output gap is closing, inflation declined from 4.0 percent in 2018 to -1.0 percent in 2019, reflecting subdued transportation and food prices. The primary sector (mainly agriculture and the oil sector) remains the main driving force contributing about two-third of the 2019 growth rate. Contributions of the secondary and tertiary sectors (mainly oil-related services) stood at 0.1 and 0.7 percentage points, respectively. The slight improvement in industry indicates a slow rise in capital investment while services benefit from strong primary sector activity (including related transport services) and the clearance of some domestic arrears.

14. **The COVID-19 outbreak and oil price shock, however, are likely to negatively impact the recovery and lead to a recession in 2020. Infrastructure investments will therefore be critical for a swift growth recovery.** Growth is expected to fall to -0.2 percent in 2020, a sharp decline compared to the World Bank's projection of 5.5 percent. The contraction is mainly due to lower oil production and weak performance in the non-oil sector. Slowdown in China's growth will affect foreign direct investment (FDI)-related imports needed to support new oil fields. The services sector – hoteling, transport, aviation and restaurant – will be severely hit due to confinement measures and border closures. Industrial production will also fall due to the restriction of movement and lower input-related imports. Inflation is expected to reach 2.2 percent (from -1.0 percent in 2019) which remains below the CEMAC convergence criteria. The current account deficit and the fiscal deficits are expected to widen in 2020 as result of the slowdown of exports, lower oil and non-oil revenues, and border closures. This impact is expected to diminish in 2021. Meanwhile growth is expected to recover in the medium term as new oil fields accelerate production, oil prices increase again, and subsidies for the COVID-19 pandemic kick in. The Government will need addition financial support to close the budget deficit. Structural reforms are needed to improve the business environment, diversify the economy, and build resilience to external shocks. Expanded access to reliable and affordable electricity will also be key to support the reform agenda and poverty reduction.

Box 2. Outlook on Macroeconomic Impact of COVID-19 in Chad

The COVID-19 outbreak and oil price shock will lead to a recession in 2020; with growth expected to fall to -0.2 percent. This represents a sharp decline in growth compared to the World Bank's projection of 5.5 percent. The contraction is mainly due to lower oil production and weak performances in the non-oil sector. Slowdown in China's growth will affect FDI-related imports needed to support new oil fields. In addition, international immobility and supply chain disruptions will curtail Glencore's oil production. The services sector – hoteling, transport, aviation and restaurant – will be severely hit due to confinement measures and border closures. Industrial production will also fall due to the restriction of movement and lower input-related imports. The two sectors contribute a combined 2.5 percent to economic growth; while the contribution from primary sector (the main driver) is only marginal at 2.3 percent. Inflation is expected to reach 2.2 percent (from -1.0 percent in 2019) which remains below the CEMAC convergence criteria.

Growth is expected to recover in the medium term. As new oil fields accelerate production, oil prices increase and the COVID-19 pandemic subsides, growth would rebound to 4.7 percent in 2021. In addition, non-oil growth would increase due to the clearance of domestic arrears, increase in transport services and strong performance in the cotton sub-sector. Inflation would remain below 3 percent in line with regional targets as GDP growth converges towards its potential.



Driven mainly by the trade balance, the current account deficit would widen in 2020. As exports slow down due to the impact of COVID-19, the oil price shock, and border closures, the current account deficit will deteriorate to -13.9 percent of GDP. This impact is expected to diminish in 2021, with export growth reaching about 9 percent. Also, import growth would reach 4 percent due to pick up in private consumption and investment. Budget support from donors will provide reliable source of financing. CEMAC regional reserves are projected to remain below 5 months of imports by 2022, the threshold required for a resource-rich monetary union with a fixed exchange rate.

The fiscal deficit will widen due to lower oil and non-oil revenues. The oil price plunge will decrease total fiscal revenues by 40 percent in 2020 and 56 percent in 2021. The lower effect in 2020 is due to higher tax revenues from Chad's main oil producer – China National Petroleum Corporation (CNPC). The structure of production sharing agreement and oil fiscal arrangement with CNPC allows the company to pay taxes with a one-year delay. For example, in 2020, CNPC will pay taxes based on profits earned in 2019. In other words, there will be lower oil revenues in 2021 due to the price and production shock in 2020 and in 2021. Hence, the fiscal deficit will stabilize at about 1.2 percent of GDP in 2020 before widening to 3.3 percent in 2021. As the Government strengthens revenue mobilization efforts, with oil revenue reaching about 6 percent of GDP, the fiscal deficit is expected to reduce to a surplus of 0.6 percent in 2022.

B. Sectoral and Institutional Context

15. **The Central African Power Pool (CAPP) remains the least developed power pool in Africa and its future very much hinges upon completing key cross-border transmission infrastructure.** Recognizing the importance of regional energy integration, in 2003 Economic Community of Central Africa States (ECCAS) established the CAPP with the mandate to develop a free power market within Central Africa by expanding regional power infrastructure and establishing a conducive legal, commercial, and technical framework. Despite the general support by members, CAPP lags far behind other power pools in Africa, mostly due to the lack of political commitment to electricity trade across the sub-region. The various founding agreements⁹ do not provide CAPP with a full legal status. CAPP's day-to-day operations are run by the Permanent Secretariat, which comprises limited core staff and relies on external committees for its core functions¹⁰. While financing mechanisms have been established, such as ECCAS' provision of a levy on electricity sales at the domestic level to finance a regional power development fund, they are not yet operational. CAPP's decision-making process is slow and cumbersome and is hampered by very limited capacity. While a Market Code was adopted in 2009, only 0.2 percent of electricity generated in the region is traded across CAPP and only via bilateral trading agreements. Similarly, members do not have the capacity to operate synchronized systems despite the adoption of a Grid Code in 2012. More importantly, the development of physical infrastructure has not kept up with the pace of institutional and regulatory advances. An incremental, bottom-up approach is better suited to develop power system integration and trade in CAPP, given its nascent status and as provided in the text box below (Box 3), this phased approach was successfully pursued by several regions. The upmost priority is to finance regional interconnections to enable a critical volume of power trade. Among projects identified in the CAPP master plan over a decade ago, only the Cameroon-Chad Interconnection has secured partial financing in 2017 by AfDB and its completion is recognized as the most impending project.

⁹ CAPP is governed by the following agreements: (i) the *Intergovernmental Framework Agreement*, which is the founding legal instrument; (ii) the *Inter-Company Agreement*, establishing CAPP's objectives and basic operating principles; and (iii) the *Central African Power Market Code*, which establishes the legal and regulatory incentive framework for investments in the interconnected regional power market.

¹⁰ CAPP's organization structure consists of a four-level architecture: (i) the *Council of Ministers in charge of Energy* of the Member States – the supreme body of CAPP; (ii) the *Executive Committee*, including Directors General or Secretaries General of energy ministries, which serves as technical body of the Council of Ministers; (iii) the *Management Committee*, which brings together the Chief Executive Officers or Director Generals of power companies, and serves as coordination body of CAPP activities; and (iv) the *Committee of Experts*, consisting of technical specialists and executives from the various energy ministries, which has technical functions.



Box 3: International Experience with Regional Power Trade

A number of regions around the world developed regional power trade and markets in the past decades, including Europe, North America, Central America, Africa and others. While the path of each region towards a regional power market is unique, some common elements and lessons learned can be distilled and serve as a guidance for regions aspiring for regional power trade. The main requirements for regional power trade include, political will of top authorities of the participating countries, power interconnection infrastructure, excess and/or complementary generation capacity, harmonization of technical aspects, and institutional development. The first three requirements are a must even for the simplest form of power trade – unidirectional bilateral trade -- that often precedes and paves the way for more complex power trade models.

A phased market development approach from bilateral trade to coordination and to integration can be illustrated by the experience of the Nord Pool, Central America power market SIEPAC, South Africa Power Pool and others. For instance, before the treaty for integration of the six electricity markets in the Central America region, bilateral trade among them already existed in the form of utility-to-utility arrangements. The market integration treaty relied on this preexisting framework to expand trade by investing in rules of commercial readiness. The treaty mandated that trading include different options such as long-term bilateral contracts, as well as spot transaction in the regional market. As the detailed rules were developed, interim regional trading platforms were gradually established, progressively expanding the trading in the region, and resulting in a final set of rules that allow for the full array of physical, financial, and physical flexible bilateral contracts. The rules provide also for a day-ahead trading platform, with day-ahead market trades that are cleared at nodal market prices.

In West Africa, the Economic Commission of West African States (ECOWAS) developed a White Paper in 2005, which recognized that electricity trade was key to accelerate access to electricity, by sharing and optimizing energy resources across the region, and pooling demand together. This has led to the creation of the West Africa Power Pool and a consistent effort to advance the objectives of regional integration with strong political support throughout the years. The ECOWAS Directive C/DIR/2/12/18 on the Securitization of Cross-Border Power Trade Under the Regional Electricity Market, adopted in December 2018 and effective in January 2020, contains measures to enforce commercial arrangements and ensure that exporters are paid, and importers receive reliable electricity.

Cameroon Power Sector

16. **The proposed Project builds on and contributes to the WBG’s extensive energy sector engagement in Cameroon over the past decade, more recently fully supporting GoC’s reform agenda, increasing efforts to promote private investments, and currently helping solve the sector’s financial sustainability issues.** For the past two decades, the World Bank has been Cameroon’s lead partner in the energy sector, supporting reforms and financing projects and technical assistance in all subsectors, including: (i) rural electrification, through the closed Energy Sector Development Project (ESDP – P104456) and REAPUR; (ii) hydropower development by supporting the construction of Lom Pangar and derisking the public-private investment of Nachtigal; and (iii) the transmission segment, by materially contributing to the establishment and operationalization of the national transmission company (*Société Nationale du Transport de l’Électricité du Cameroun*, SONATREL) following the unbundling reform, and providing financing for the expansion of the transmission network through the Electricity Transmission and Reform Project (ETRP – P152755, approved in 2016). More importantly, the World Bank is engaged in close policy dialogue to help solve outstanding regulatory and financial issues affecting the electricity sector (Box 4). Following a series of reforms (see next paragraph), with some of them incomplete, the sector remains fluid and populated by a wide number of stakeholders with contrasting interests. Such engagement is at the core of WBG’s energy sector assistance program and all World Bank-financed projects, including the proposed Project, are expected to contribute from different angles to lift the sector financial and operational performance. Specifically, by enabling the expansion of lower-cost electricity supply and power trade, the proposed Project is intended to lower electricity costs in the country, help expand the customer base and provide additional revenues through export of excess supply.



Box 4: World Bank's Support to the Structural Issues of Cameroon's Electricity Sector

Debt and arrears in the sector originate from unpaid electricity bills, inadequate subsidy compensation, incomplete regulation and poor operational performance on the part of the privatized distribution company (Energy of Cameroon – ENEO). A significant part of the arrears is linked to the non-payment of electricity bills by government and parastatal entities, as well as delays in the payment of the tariff compensation by the GoC, which altogether affect ENEO's financial situation and have ramifications across the value chain. ENEO owes outstanding payments to independent power producers (IPPs), the SONATREL, the basin operator (Electricity Development Corporation, EDC) and fuel suppliers. Faced with non-payment, foreign IPP investors threaten to shut down operations and power companies are short of funding for investment in the power network. On the other hand, ENEO operational performance remains weak and the company has not met the service and investment targets envisaged under the concession contract. Arrears also derive by disagreement on or lack of commercial contracts among the various operators. The transmission company SONATREL has been established by terminating the transmission concession originally entrusted to ENEO. However, disputes remain between the two concerning the transfer of transmission assets and the wheeling charge, which prevent SONATREL from opening its balance sheet and collecting an adequate stream of revenues. Similarly, EDC has not yet signed a water concession with the GoC and since the commissioning of the Lom Pangar dam in 2015, has not received any payments from ENEO for the water storage services.

World Bank's response is multifaceted. Prior actions have been built in the various tranches of the DPF series¹¹ to support: (i) the clearance of arrears across the value chain; (ii) a sustainable process to ensure funding and timely payment of bills and any compensatory subsidies; and (iii) the commitment by ENEO to improve its operational performance and complete investments, through a set of agreed key performance indicators (KPIs) to be met under the concession contract. In the immediate term, the World Bank has also advocated the establishment of a working group involving all key sector stakeholders and headed at the highest level of the GoC to reach an agreement on the level of arrears and solutions for payment. The working group shall be later supported by external expertise to develop a mechanism for prioritizing and allocating funds of the "cash waterfall" type. There is also a consultant already in place for defining KPIs for ENEO, which would report to the same working group for finalization of KPIs within 6 months, including any revisions needed in the ENEO concession for operationalizing cash waterfall. This would enable ENEO to raise funds from local and international sources (including Development Financial Institutions – DFIs) for meeting the agreed performance indicators. The ongoing third DPF would be contingent on having KPIs and cash waterfall system agreed between stakeholders. Furthermore, the World Bank has developed a financial model to assess the cost of service across the value chain and identify the needed efficiency gains and subsidy levels, which may inform future tariff reviews. The World Bank is also mediating discussions concerning the settlement of GoC debt versus ENEO and the potential use by ENEO of GoC's bonds to pay dues to IPPs.

The World Bank is supporting transitional solutions concerning the contract between SONATREL and ENEO, as well as following closely the finalization of the institutional framework for the water rights (fiduciary circuit for payment, water storage concession contract etc.) led by the Ministry of Energy and Water (MINEE). Furthermore, the ongoing Hydropower Development on the Sanaga River Basin Technical Assistance Project (P157733) is supporting technical and regulatory capacity to enable more private sector-led hydropower development to feed domestic and regional demand, and regulatory reforms to provide long-term policy certainty.

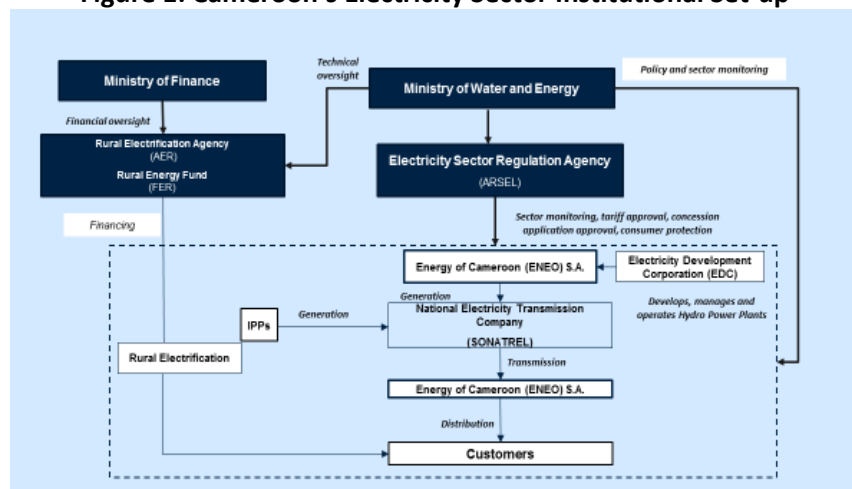
17. **During the last two decades, Cameroon's electricity sector has gone through a series of structural reforms, geared towards enhancing sector efficiency and attracting private investment in generation, transmission, distribution.** In 1998, the GoC enacted the Electricity Law which established the electricity regulator (*Agence de Regulation du Secteur de l'Electricite*, ARSEL) and the rural electrification agency (*Agence pour l'Electrification Rurale*, AER). Generation was partially unbundled by opening the generation sub-sector to competition and allowing third-party access to the transmission grid while setting up independent dispatching. In 2001, the GoC privatized the state-owned, vertically integrated power utility (*Societe Nationale d'Electricite*, SONEL), through the sale of a 56 percent equity stake and the award of a 20-year concession to the American Electricity Supply Corporation (AES), thus creating AES SONEL. In 2014,

¹¹ Fiscal consolidation and inclusive growth DPF series (P163651 in FY19, P166694 in FY20, P168332 in FY21).



AES SONEL became ENEO after AES sold its equity share to ACTIS, a British private equity firm. Finally, in 2011, the GoC enacted the New Electricity Law which introduced key reforms, including: (i) the transmission sub-sector was unbundled from ENEO's concession mandate and a state-owned SONATREL established, although this became operational only in 2019; (ii) new governance arrangements for water storage were introduced, including the transfer of the water storage concession of the Sanaga Basin reservoir to a dedicated company (EDC); and (iii) a new tariff regime was established. SONATREL is responsible for development and operation of the transmission grid nationally and the interconnections with neighboring countries. In 2015, the GoC formalized SONATREL's role as national transmission system operator (TSO) and requested support from the World Bank under ETRP to strengthen its capacity and make the company operational, as well as to implement an investment program targeting urgent rehabilitation and expansion of the transmission network. Considerable results were achieved through the above sector reforms. In particular, the reforms successfully attracted private sector participation in generation, where investments delivered the 216 megawatt (MW) gas-fired Kribi power plant and 88 MW heavy-fuel oil (HFO) Dibamba power plant and the upcoming 420 MW Nachtigal hydropower plant, which is one of the few public-private partnerships (PPPs) in hydropower in SSA. International Finance Corporation (IFC) and Multilateral Investment Guarantee Agency (MIGA) materially contributed to the privatization of the distribution utility. Furthermore, International Bank for Reconstruction and Development (IBRD), MIGA and IFC have provided risk mitigation, insurance and debt and equity for all these projects. Figure 1 presents Cameroon's electricity sector institutional set-up.

Figure 1: Cameroon's Electricity Sector Institutional Set-up



18. **Despite the extensive reform effort, Cameroon's electricity sector still faces substantial challenges, including the uneven access to service, ENEO's weak performance, incomplete governance, SONATREL's operational constraints and underinvestment in network infrastructure.** Electricity access in the country reaches about 50 percent, which indicates that a significant portion of the population is not connected despite being in proximity of the grid. Also, this national average masks striking disparities between the southern and center regions, where access varies between 80 and 100 percent, and the northern regions where it remains much lower. ENEO's technical and commercial losses are high at 30 percent, and the company has failed to expand the network in line with electricity access needs. As detailed in Box 4, its financial standing is impaired. While the average electricity tariff currently standing at US\$0.16/kilowatt-hour (kWh) is rather high compared to the regional average of US\$0.13/kWh, it falls below cost recovery, which requires the GoC to compensate ENEO for the revenue shortfalls. The inadequate liquidity compels the utility to delay maintenance and rely on costly short-term borrowing to finance its operations. In 2018, ENEO's payment delays caused independent power producers to reduce generation, increasing load-shedding and prompting ENEO to employ expensive diesel engines to partially fill the gap. Delayed network maintenance and investment further weaken the reliability of electricity services.



SONATREL has been operational since January 1, 2019, but in the absence of transmission service agreements (TSAs), especially with ENEO and with assets yet to be transferred (Box 4), the company's financial situation remains fragile, and its operational capacity, let alone investment capacity, is impaired. In these circumstances, public funding will continue to be needed to catch up on the backlog of investments in transmission infrastructure.

19. **Cameroon's abundant hydropower potential holds the key to accommodating growing electricity demand in the country at the least cost as well as to becoming a regional net exporter of electricity.** Cameroon's hydropower potential is estimated at 12,000 MW, the third largest in SSA, to be found notably in the Sanaga River Basin in the South of the country. According to Cameroon's 2014 Least Cost Power Sector Expansion Development Plan (*Plan de Développement du Secteur de l'Électricité*, PDSE), hydropower is the most effective option to accommodate demand for electricity, and in fact by 2023 it should account for 75 percent of the country's energy mix (see Annex 3). Among all sites, the Sanaga River Basin offers the best opportunities to scale up generation capacity well beyond national needs. The Lom Pangar Hydropower Plant Project (LPHP – P114077), financed by the World Bank and commissioned in June 2017, increased the guaranteed, all-season hydropower capacity on the Sanaga River by approximately 40 percent, leading immediately to an additional 120 MW of generation capacity of the Memvé'ele hydropower project during dry seasons. In the medium-term, the Lom Pangar dam will enable further development of a series of large-scale capacity and hydropower sites downstream at very competitive prices. Among them, the next in line is the 420 MW Nachtigal plant, which was financed by IFC in 2018 with a partial guarantee from IBRD/IDA (P157734). Once constructed by 2024, Nachtigal is expected to provide an additional 30 percent of installed generation capacity to Cameroon from renewable energy resources. Overall, it is estimated that 4,200 MW of capacity could be added on the Sanaga River through large hydropower sites and 1,800 MW through smaller sites.

20. **Building a national transmission network is a sine-qua-non condition to accommodate demand in the northern regions and enabling regional power trade.** Cameroon's power transmission system consists of three networks, including RIS, RIN and the Eastern Interconnected Network (*Reseau Interconnect Est*, RIE). RIS and RIE are currently connected to one another; RIS and RIN are not, de facto creating two isolated power systems in the country. RIS connects all hydropower plants on the Sanaga River, but in the absence of interconnections among the three systems, their supply can only serve the southern region and will become redundant soon. Building a national transmission network is critical to enable the development of the hydropower potential of the Sanaga River Basin as part of an optimized national power system, with large benefits in terms of expanded and more cost-efficient electricity supply. In particular, PDSE has identified the interconnection of RIS and RIN as the most impeding investment to provide electricity to the northern regions. Furthermore, a South-North transmission backbone is the key piece of infrastructure to enable Cameroon to connect to neighboring countries such as Chad and Nigeria and monetize its excess electricity supply through exports.

Chad Power Sector

21. **The proposed Project marks the World Bank's reengagement in Chad's power sector after more than a decade, at a time when the sector faces paramount challenges.** These includes an access rate amongst the lowest in the world, costly diesel-based domestic generation and high operational and commercial inefficiencies on the part of the virtually bankrupt national utility SNE, which relies largely on budget transfers to finance its operating costs. The Project is at the core of the national strategy to reduce electricity supply costs and expand electricity services across the country. Together with two additional operations scheduled for FY21, focused on sector reforms on one hand, and on decentralized electrification on the other hand (see hereafter and Box 5 below), the Project is integral to the World Bank's reengagement strategy in the sector, articulated along three pillars: (i) reducing the cost of electricity generation through diversification of the energy mix towards cheaper sources, namely affordable imports and domestic solar generation; (ii)



improving the financial sustainability of the energy sector; and (iii) increasing access to modern electricity sources. In addition to the proposed Project, the World Bank is preparing the Chad Energy Access and Fiscal Management DPF (P173755), an energy DPF programmatic series that will be presented to the board tentatively in Q2FY21 to support critical reforms in the sector aimed at expanding electricity access in a sustainable manner, in line with the Alliance for Sahel and Sustainable Development Goal (SDG) 7 objectives. With regards to solar home systems, the World Bank approved the Regional Off-Grid Electrification Project (ROGEP – P160708) in April 2019, which provides a line of credit for private entrepreneurs across 19 countries in West and Central Africa, including Chad. IFC is providing a loan guarantee for SMEs that are manufacturing solar products through the IDA PSW. One of the key IFC objectives in the CPF FY16-20 for Chad has been to improve the environment for private sector investment, including in the energy sector, through technical assistance for the development of a PPPs strategy as well as an Energy Sector Diagnostic, as IFC and other similar DFIs face a number of challenges investing in Chad due to a difficult business environment, small project sizes, the difficulty of finding experienced sponsors and administrative bottlenecks. MIGA's efforts will focus on augmenting renewable energy-based generation and expanding off-grid energy access.

Box 5: World Bank's Support to Energy Sector Reform Program in Chad

The World Bank's reengagement in the energy sector in Chad aims to support the Government to cost effectively extend access to electricity services in a financially sustainable manner. Proposed measures are articulated to concomitantly address three main challenges, jointly trapping the sector in a vicious circle of insufficient revenues, poor service quality and limited willingness to pay, namely: (1) costly generation; (2) high operational and commercial inefficiencies; and (3) low access rate growing at a slow pace.

- **Reducing cost of supply will be achieved through diversification of the energy mix towards cheaper sources, that is affordable imports and solar photovoltaics (PV).** Private sector participation will be critical to materialize priority investments in least cost generation options. Proposed reforms in this area include: (i) systematic least cost planning; (ii) switching from costly diesel towards cheaper HFO for domestic thermal plants; and (iii) fully structured competitive process to select IPPs for priority projects in renewable sources. In parallel, the regional interconnector infrastructure will significantly contribute to structurally reduce cost of electricity supply in Chad and, in the long run, valorize its variable renewable energy potential at scale on the regional market.
- **Improving the overall performance of the utility SNE would contribute to reduce sector financing gap and gradually downsize operating subsidies weighing on Chad's limited fiscal space.** Proposed measures in this area include (i) the signature of a performance contract between the State and SNE; (ii) a Revenue Protection Program to ensure full billing of electricity delivered to clients; and (iii) centralized structured mechanism to ensure timely payments of electricity bills by public clients. Improving SNE performance and creditworthiness as off-taker is critical to enable private sector participation in domestic generation, as well as cross border trade under the proposed project. A shift in the energy mix towards renewable energy would go a long way to reduce the cost of service, and electricity trade is an important part of that strategy.
- **Ultimately, a financially sustainable sector would enable rapid access expansion to modern electricity services across the country, in line with national, Sahel Alliance and SDG7 objectives.** Proposed measures in this area include (i) adoption of a national electrification strategy with least cost option for electrification targets (grid extension, mini-grid and solar home systems) and coherent institutional arrangements to support implementation; (ii) incentive scheme to make mini-grid and off-grid solutions affordable for low-income households; and (iii) structured competitive process to select private concessionaires for mini-grid in priority areas. In parallel, the proposed project will support grid extension and densification in Ndjamen to cost effectively increase access rate to household and MSMEs.

Sector reforms would set the stage for the deployment of critical investments supported by WBG through Maximizing Finance for Development (MFD) approach. The Chad Energy Access and Fiscal Management DPF (P173755), an energy DPF programmatic series, is expected to deliver its first operation by Q2FY21, in close cooperation with MIGA and IFC teams. A technical assistance program under the Sahel Alliance is under preparation to support the Government in delivering the reform program. The proposed Project is a cornerstone in the national strategy for the sector and will capitalize on the reform program to maximize its impact on the diversification of the energy mix as well as access in Ndjamen. In addition, ROGEP is supporting the development of a market for off-grid solutions, while a dedicated national access operation may be contemplated next fiscal year focusing on mini-grid development through MFD.



22. **The Chad power sector institutional, legal and regulatory framework is being developed.** The Ministry of Petroleum and Energy (MPE) oversees the energy sector, including planning, policy formulation and implementation, and sector monitoring and evaluation (M&E). MPE supervises the national power utility SNE and the Rural Electrification, Energy Efficiency and Renewable Energy Agency (ADERM). ADERM was created under the Electricity Law of August 2019, that also reestablished the Electricity Sector Regulatory Entity (ARSE). In addition, the Law liberalized the power sector, with notional unbundling of generation, transmission and distribution, with the objective to promote private sector participation in both generation and distribution segments. At the same time, SNE retains its position as the vertically integrated national power utility combining generation, transmission, distribution and electricity retails.

23. **Chad has one of the lowest electricity access rates in SSA and power supply is very limited.** Although blessed with significant solar, wind, oil and gas resources, the country's electricity access rate at about 8 percent (20.2 percent urban and 4.5 percent rural) is amongst the lowest in the world and in SSA (where the average is 43 percent). Access is concentrated in N'Djamena, which accounts for 80 percent of SNE sales. Yet, only a third of the population there is served, and service quality remains poor. Besides N'Djamena, a few cities have electricity networks (six regional centers and five secondary towns) but these are not interconnected. The bulk of available generation capacity, mostly diesel-based, is located in the capital city of N'Djamena; it comprises an SNE plant of 71 MW and IPP plants of 46 MW. Installed available generation capacity outside of N'Djamena is below 10 MW. Due to inadequate electricity supply by SNE, many enterprises and also some households use self-generation equipment. In the absence of a least cost development plan, over 25 unsolicited IPP proposals, mostly solar PV with a total capacity exceeding the current capacity of the network, are tentatively in the pipeline.

24. **Electricity sector challenges compound Chad's increasingly distressed financial position.** Because of the reliance on diesel-based generation and SNE operational and commercial inefficiencies, the cost of electricity service is extraordinarily high in Chad (US\$0.43/kWh billed), significantly exceeding the average tariff of US\$0.25/kWh. SNE infrastructure is ageing and in disrepair due to the chronic loss-making operation of the company. Total losses and collection rates are at 35 and 43 percent respectively. As a result, SNE collects revenues for less than a third of the electricity injected into the network. Client receivables and suppliers' debt increase at an unsustainable pace. SNE relies entirely on the Government's support to operate, in the form of fuel supply, which imposes a huge fiscal toll. In 2017, subsidies exceeded electricity sales and represented 0.8 percent of GDP. Still, SNE is facing chronic cash shortages and is not in a position to properly maintain its assets, let alone investing access expansion.

25. **Imports of more cost-efficient electricity and diversification of the energy mix towards solar PV generation are key to improve electricity service in a sustainable manner.** Importing cleaner and more cost-efficient firm electricity from Cameroon will allow Chad to more than double its power capacity and increase on-grid access to electricity in the country. Furthermore, imports will reduce the cost of power supply and help the country develop alternative renewable energy resources – solar and wind – that otherwise are constrained by the small size of the domestic power system. Improvements in the operational and financial performance of SNE will further help reduce the cost of service and gradually bridge the gap towards cost reflective tariffs, thereby reducing the need for budget transfer to the sector.

D. Relevance to Higher Level Objectives

26. **The proposed Project is aligned with the ongoing WBG's Country Partnership Frameworks (CPF) for Cameroon and Chad.** The Cameroon CPF for the period FY17-21¹² targets the expansion of electricity supply in the country as a

¹² Report No 107896; March 28, 2017.



means to support increased business and employment opportunities and overall private sector development. The development of a national power transmission system is instrumental to this objective. The Chad CPF for the period FY16-20¹³ also recognizes the importance of the energy sector as part of Engagement Theme 1 focused on strengthening the management of public resources, which includes a focus on energy.

27. **The Project supports Cameroon’s aspiration to become an emerging economy by 2035.** Expanded, reliable and cost-efficient power supply is key to making Cameroon’s businesses more competitive, support the diversification of the economy away from oil and reduce unemployment, thereby increasing the resilience of the beneficiaries. The connection of the RIS and RIN will guarantee the full absorption of newly installed hydropower capacity, thus making the existing and planned hydropower projects more appealing to private investors. Electricity exports will provide an important source of hard currency revenues. Overall, the Project contributes to some of the key priority areas identified under DSCE to implement Vision 2035, and notably the development of the national infrastructure base, more modern production systems and regional integration and trade. The project will also support Cameroon’s Initial Nationally Determined Commitments (INDCs) that are planned to be achieved inter alia through the integration of Cameroon into the Central Africa Power Pool and the increased use of hydropower resources for meeting domestic electricity needs.

28. **The Project will support the implementation of Chad’s long-term development strategy "Vision 2030: le Tchad que nous voulons".** Given the important role of electricity access, the Project will support the implementation of the strategy which aims to improve the quality of life of Chadians by developing human and social capital, social protection and economic empowerment. The Project is mentioned in Chad’s INDCs, which lists Chad’s unconditional mitigation goal of reducing greenhouse gas (GHG) emissions by 18.2 percent by 2030 (41,700 GgCO₂e based on a reference year of 2010) and a conditional mitigation goal of reducing GHG reductions by 71 percent by 2030 (162,000 GgCO₂e).

29. **The Project supports the World Bank’s regional integration and partnership approach for Africa.** By supporting regional infrastructure connectivity through power exports, the Project can attain economies of scale which would be difficult to achieve at a national level, lowering costs to end-users, improving supply reliability and offering more environmentally friendly generation. The Project is in line with the two pillars of the World Bank’s Africa Strategy¹⁴: the first promotes competitiveness, including through support to infrastructure development and attracting private sector investments, and the second pillar aims to reduce vulnerability and increase resilience to macroeconomic shocks due to high international oil prices. The Project is also consistent with the World Bank’s regional integration strategy for Africa (*Supporting Africa’s Transformation: Regional Integration and Cooperation Assistance Strategy for the Period FY18-FY23*) approved in 2017, whose strategic priority #2 *Develop functioning regional markets in four priority sectors*, explicitly recognizes energy as one of the four sectors that is ripe for integration. As a result, the strategy focuses on laying the foundations of power pools, which first and foremost requires the completion of cross-border interconnectors.

30. **The Project supports the commitments of the Sahel Alliance.** Since 2014, Burkina Faso, Mali, Mauritania, Niger and Chad have come together as G5 Sahel group, in an effort to coordinate policies and strategies for shared development and security. In 2017, the European Commission, France, Germany, the World Bank, the AfDB and the UNDP launched the Alliance for the Sahel, which seeks to increase financial and technical resources available to the Sahel to address the multi-faceted challenges of fragility and to promote increased resilience and economic opportunities, including for the most vulnerable. Among the five sectors of focus, the Alliance has proposed the ambitious target of doubling energy access and installed capacity of renewable energy during the period 2018-22, to address energy poverty and to lower

¹³ Report No 95277; December 22, 2015.

¹⁴ <https://www.worldbank.org/en/region/afr>



sector costs, as an intermediary objective before reaching the SDG 7 of universal access by 2030. This inevitably hinges upon power trade between energy-rich and energy-starved countries, as supported under the proposed Project.

31. **The Project is consistent with the WBG’s approach to MFD.** The Project is part of a comprehensive World Bank engagement in the energy sector providing support across the value chain throughout the Central Africa region. In particular, in Cameroon, the WBG is leveraging synergies between IDA, IBRD, IFC and MIGA to advance energy sector reforms and provide coordinated technical and financial support to attract private capital for commercially viable hydropower projects. In Cameroon, the size of hydropower potential in the Sanaga River Basin largely outstrips demand in the southern regions, and by enabling a larger demand across the country and beyond its borders, the Project will contribute to raise the bankability of future hydropower plants to be developed as PPPs or IPPs. On the Chad side, the Project will allow electricity supply from Cameroon to reach centers of demand there.

II. PROJECT DESCRIPTION

32. **The Project has been identified as priority by the respective ministries of finance of Cameroon and Chad and is regarded as a priority project for both the Sahel Alliance and the CAPP.** The proposed Project entails construction of nearly 1,556 km of HV transmission lines (1,318 km in Cameroon and 238 km in Chad), which will connect Cameroon’s southern and northern power systems (RIS-RIN Interconnection), and northern Cameroon to Chad, through the AfDB-financed Cameroon – Chad Interconnection (Figure 2). Cameroon’s PDSE has identified the RIS-RIN Interconnection as the most critical piece of transmission infrastructure domestically, as it will provide the country with a long-needed national transmission network. The PDSE also recognizes the benefit of power trade with Chad based on the cross-border interconnection. In Chad, electricity imports from Cameroon are the least-cost option to substitute overly expensive domestic thermal generation while domestic generation alternatives, and notably solar capacity, are developed.

Figure 2: Infrastructure Financed under the Project





33. **While being a bilateral project, the Cameroon-Chad Interconnection will also constitute the first high voltage interconnector to be constructed for the development of CAPP.** The Project has been identified as a top priority under the master plan for the period up to 2030 prepared by CAPP, building on a list of 16 cross-border lines that were endorsed by the member countries of the ECCAS in 2004.

A. Project Development Objective

PDO Statement

34. The Project Development Objectives (PDO) are: (i) to interconnect the Southern and Northern power systems of Cameroon; (ii) enable electricity trade between Cameroon and Chad; and (iii) to increase access to electricity in the Chad capital city of N'Djamena.

PDO Level Indicators

35. The expected PDO level results include:
- (a) Electricity transmitted from RIS to RIN (MWh per year)
 - (b) Electricity traded between Cameroon and Chad (MWh per year)
 - (c) People provided with new or improved electricity services (number)

B. Project Components

36. **Component 1: Cameroon RIS-RIN Interconnection (US\$375 million equivalent, of which IDA credit US\$295 million and counterpart funding of US\$80 million),** which will finance all costs associated with the construction of the RIS-RIN Interconnection. Specifically, this component is articulated in the following sub-components:

- (i) Sub-component 1.A: Construction of RIS-RIN Interconnection (US\$266 million, all IDA credit).** The RIS-RIN Interconnection will be a double-circuit 225 kV transmission line spanning over 514 km from Nachtigal in the RIS to Hourou Oussoa substation (near Ngaoundere) in the RIN with four substations (Ntui, Tibati, Yoko and Hourou Oussoa). All costs related to works and equipment for the construction of the line and the substations, will be financed through the IDA credit. Consistent with the Environmental and Social Impact Assessment (ESIA), the routing of the RIS-RIN takes due account of flooding risks, which may be increasing due to climate change, and specifically avoids the main flooding areas of Reservoir du Maga and Fleuve du Lagone. The substations will be designed to withstand increased ambient heat of at least 50 degrees due to climate change concerns, which has an incremental cost of two percent.
- (ii) Sub-component 1.B: Project implementation support to SONATREL (US\$24 million, all IDA credit).** This sub-component will finance the establishment of a Project Implementation Unit (PIU) within SONATREL, specifically assigned to implement the construction of transmission lines and associated infrastructure under the Project, including the RIS-RIN Interconnection and the section of the Cameroon-Chad Interconnection within Cameroon's borders. This unit will be responsible for ensuring compliance with World Bank's Operational Policies and will be adequately staffed. SONATREL will hire a reputable international engineering company to serve as Owner's Engineer (OE), which will support the PIU in all activities pertaining to project management and supervision, including: (i) procurement, design, construction, preparation of operation and maintenance (O&M) of the transmission line; (ii) construction and reinforcement of sub-stations; (iii) supervision and monitoring of Environmental and Social Management Plan (ESMP) and Resettlement Action Plan (RAP) implementation as well as social risks, based on an agreed monitoring plan; and (iv) preparation of studies, including environmental and social, as needed.



(iii) Sub-component 1.C: Implementation of the ESIA(s), ESMP(s) and RAP(s) (US\$83.5 million, of which US\$3.5 million IDA credit and US\$80.0 million of counterpart funding). This sub-component will finance the implementation of the ESIA, ESMP and RAP related to the RIS-RIN Interconnection. Costs for cash compensation and assistance of project-affected people (PAP) will be covered by the GoC. Also, the majority of ESMP measures will fall under the responsibility of contractors and will be included in the construction contracts. Additional costs for eligible expenditures (such as consulting services, awareness campaigns, costs for operating the Divisional Committees in charge of monitoring ESMPs in the project areas, training, etc.¹⁵) to support the RAP and ESMP implementation by government authorities or SONATREL will be covered by IDA). The estimated costs of the RAP and ESMP are only tentative at this stage. The exact locations affected by the line and the technical specifications of the needed infrastructure remain to be confirmed based on the ongoing detailed network study. SONATREL has completed a preliminary ESIA, which has identified in broader terms environmental and social risks associated with the Interconnection and related mitigation measures. A full ESIA including a RAP will be prepared and disclosed based on the results of the network study expected by September 2020.

(iv) Sub-component 1.D: Technical assistance for the negotiation of contracts for power trade and for commercialization of optical fiber (US\$1.5 million, all IDA credit). This sub-component will finance training and consulting services to support the preparation and negotiation of contracts needed for power trade and the commercialization of optical ground fiber (OPGW) along the Cameroon-Chad Interconnection. Specifically, a consultant will be mobilized to: (i) provide training on the principles and the different forms of power trade contracts, including power purchase agreements (PPAs) and TSAs from the viewpoints of buyer, seller, and financiers, and advice on the key aspects of contract negotiation in terms of operation, schedule, penalties for under delivery, payment terms, and termination; and (ii) help draft term sheets for PPA and TSA and assist in their finalization/negotiation. While the GoC is expected to assign the entities that will enter such contracts, funding will be provided to SONATREL to advance the procurement process. SONATREL will also hire a consultant firm to assist the PMU in identifying the process, business model and contract needed for the resell of the optic fiber capacity available on the network.

37. Component 2: Cameroon-Chad Interconnection (US\$328 million equivalent, of which US\$49 million IDA grant, US\$265.5 million AfDB; US\$13.5 million of counterpart funding). This component will involve construction of 805 km of HV transmission lines and associated substations to connect the power systems of Cameroon and Chad. Specifically, in Cameroon, SONATREL will:

(2A) construct a 225 kV double-circuit HV transmission line spanning about 250 km from Hourou Oussoua to Garoua 2 and the related 225/30 kV substations at Garoua 2 and Kousseri as well as reinforce the 225/30 kV substations at Hourou Oussoua and Maroua 2;

(2B) construct a 225 kV single-circuit HV transmission line spanning about 196 km from Maroua to Kousseri to the border with Chad; and

(2D) construct a second 225 kV single-circuit high-voltage main transmission line spanning about 120 km between Maroua to the border with Chad.

In Chad, SNE will:

(2C) construct a 225 kV single-circuit HV transmission line spanning about 14 km from the border with Cameroon to Gassi;

(2E) construct a 225 kV single-circuit HV main transmission line spanning about 225 km between the border with Cameroon, Bongor, Guelendeng and Gassi;

(2F) construct two new 225/30 kV substations at Bongor and Gueledeng and upgrade to 225 kV the existing 90/30/15 kV

¹⁵ See paragraph 131 for details.



substations at Gassi.

In addition, SONATREL and SNE will hire a common OE (2G) to supervise the construction of the line within their respective countries' borders.

38. Costs for this component will be shared as follows (see Table 1 for a detailed breakdown):

- a) AfDB will finance the Interconnection within Cameroon's borders¹⁶ as well as the costs of the common OE to be borne by SONATREL (2A-2D);
- b) The GoC will finance the compensation of PAP (RAP costs) in Cameroon;
- c) IDA and AfDB will co-finance on a parallel basis the costs of the interconnection within Chad's borders. Specifically, AfDB will finance the contract for the HV transmission lines (2C, 2E); IDA will finance the contract for the HV substations in Bongor, Guelendeng and Gassi (2F);
- d) IDA will cover the costs of the common OE to be borne by SNE; and
- e) Compensation of PAP in Chad is expected to be financed by AfDB.

39. While the routing avoids the flooding areas altogether, contingencies in the amount of 10 percent of the infrastructure investments have been included to cover incremental costs (namely chimney extension for towers' foundations) due to unexpected flooding.

40. All co-financing with AfDB will be in the form of parallel financing as the AfDB and IDA will finance separate work contracts as identified in the procurement plan. Also, the common OE will enter into two separate contracts with SONATREL and SNE, financed respectively by AfDB and IDA. It should be noted that the costs of the cross-border line and AfDB financing are based on the analysis conducted at the time the AfDB project was approved and will have to be confirmed based on the detailed technical study soon to be launched. Funding from the IDA allocation to Chad (US\$9 million, all IDA grant) is set aside to address any contingency that may arise, since the country is new to the construction of HV, cross-border transmission infrastructure and in light of the fragile context with limited track record on risk premiums associated with large infrastructures contracts. Conversely, in Cameroon this type of investments, and the related technology and market, are well tested.

41. The interconnector will contribute to enable the integration of intermittent renewable energy into the Chadian grid, notably solar PV generation that may be developed. In parallel to the Project, AfDB will finance the electrification of rural areas along the corridor of the interconnector, with additional financing in the order of US\$40 million¹⁷.

42. **Component 3: Electricity access in Chad (US\$41 million equivalent, all IDA grant).** This component will finance investments to enhance and expand the electricity grid in N'Djamena and improve the technical and operational performance of SNE; as well as project implementation support. This component is expected to contribute to economic activities, improve shared prosperity, and enhance the resilience of host communities to climate change¹⁸. Activities are broken down in two sub-components as follows. The detailed cost breakdown of Component 3 is presented in Annex 2.

(i) Sub-component 3.A: Access expansion (US\$33 million), which will finance: (i) the rehabilitation and expansion of the electricity transmission and distribution assets in N'Djamena, including power lines, substations, and transformers;

¹⁶ In addition to the proposed project, the IDA-financed ETRP (P152755), currently under implementation, will finance, *inter alia*, investments on the Garoua-Maroua 225 kV axis that will be used as part of the overall cross border transmission infrastructures, for a total amount of US\$70 million.

¹⁷ It is expected that 478 localities will be electrified along the line, of which 409 in Cameroon and 69 in Chad.

¹⁸ World Bank, 2018. Lifelines, the Resilient Infrastructure Opportunity, Global Facility for Disaster Reduction and Recovery (GFDRR).



(ii) the rehabilitation modernization of the Supervisory Control and Data Acquisition (SCADA) system, including a telecommunication equipment for 47 substations; and (iii) improvements in SNE performance, through supply and installation of about 100,000 smart/pre-paid electricity meters and commercial management and billing systems, as well as technical support to implement these systems. More specifically, the Project will extend the HV substations of Gassi and Lamidji and add four connections to the MV network per substation to improve quality of service. The existing MV/LV network will be rehabilitated to decrease technical losses in N'Djamena. The distribution network will be extended and densified with the objective to double SNE's clients base in N'Djamena and the upgrade of the dispatching center will improve security of supply. In order to improve SNE operation and commercial performance, the Project will finance SNE's acquisition of an enterprise resource planning (ERP) software for the management of corporate resources, the roll-out of a geographic information system (GIS) for the MV/LV network and a client's database. The Project will finance a Revenue Protection Program (RPP), with the installation of a data management software and a fully integrated commercial management system, alongside with the deployment of smart/prepaid meters. This sub-component will also finance the preparation and implementation of the required safeguards instruments during Project implementation¹⁹, including ESIA/ESMPs and RAPs²⁰, for the network investments in N'Djamena. Finally, specific activities aimed to reduce disparity of electricity access of poorer urban households, and in particular female-headed households, will be identified and financed. Affordability is the key driver behind the gender gap in electricity access²¹ as evidenced by a gender gap in most wealth quintiles in N'Djamena. Therefore, the Project will support measures to increase SNE client's base, targeted towards reducing affordability constraints faced by female groups and closing the observable gap between male-headed and female-headed households connecting to the grid. In addition, interventions such as information campaigns and initiatives raising consumer awareness and lowering the administrative burden on female customers, could be included, based on a gender assessment.

(ii) **Sub-component 3.B: Project implementation support (US\$8 million)**, which will support the PIU within SNE, as well as advisory services for PPA preparation and sector development. Support to SNE's PIU will notably encompass the recruitment of: (i) the OE to prepare the priority investment program for the N'Djamena power grid and subsequently support SNE in supervising its implementation (US\$2 million) and (ii) the consulting company to provide project management support to the PIU to be established within SNE²² (US\$3 million). In addition, this sub-component will provide transaction advisory services to SNE and the Government of Chad for the preparation and negotiation of contracts needed for power trade with Cameroon through the cross border interconnector, including critical commercial and operational arrangements (schedule, penalties, payment terms, risk mitigation arrangements and termination). It will also include technical assistance to the MPE on selected power sector topics.

Table 1: Breakdown of Project Costs and Financing (US\$ millions)

Component	Activity	IDA Credit	IDA Grant	AfDB	Counterpart	Total
Component 1	RIS-RIN Interconnection	295.0			80.0	375.0
1.A	Construction of RIS-RIN Interconnection	266.0				266.0
1.B	Project implementation support to SONATREL	24.0				24.0
1.C	Implementation of ESIA, ESMP and RAP	3.5			80.0	83.5

¹⁹ In line with ESMF/RPF already disclosed by Chad on April 17, 2020.

²⁰ Since ESIA/ESMPs/RAPs for electrification expansion are yet to be prepared, the related costs, especially for PAP compensations, are not known at this stage. The Government of Chad committed to cover such costs. Shall this reveal not feasible, and as the last resort, the opportunity to use IDA financing and restructure the Project could be assessed once the final instruments are available.

²¹ This would be confirmed by a planned initial baseline assessment.

²² « Assistance à la Maitrise d'Ouvrage (AMO) » in French.



1.D	Technical assistance for the negotiation of commercial contracts for power trade and for commercialization of optical fiber	1.5				1.5
Component 2	Cameroon-Chad Interconnection		49.0	265.5	13.5	328.0
2.A-G	Cameroon-Chad Interconnection		34.0	241.0		275.0
	ESMP and RAP			7.0	13.5	20.5
2. F-H	Common OE for Interconnection		6.0	17.5		23.5
	<i>Unallocated amount</i>		9.0			9.0
Component 3	Electricity access in Chad		41.0			41.0
3.A	Access expansion		33.0			33.0
3.B	Project Implementation support		8.0			8.0
Overall costs (US\$ million)			295.0	90.0	265.5	93.5
				744.0		

43. A project duration of seven years is envisaged to enable enough time for the preparation of detailed technical analyses and ESIA/ESMPs and RAPs for Components 1 and 3.

44. **Mitigation and Adaptation Climate Co-benefits.** Activities supported by the Project will generate mitigation and adaptation climate co-benefits (CCB). Mitigation CCB will be achieved through the Project by replacing HFO/diesel fuel for power generation in the Northern Cameroon and Chad with predominantly hydropower-based energy from Southern Cameroon. In Chad, the share of solar energy is projected to increase from zero to nearly eight percent in 2030, in large part due to the interconnector, which will constitute the first transmission backbone in the country. Electricity imports from Cameroon will allow Chad to decrease the combined share of HFO and diesel from 100 percent in 2020 to 43 percent by 2030. Mitigation benefits will be further supported through a reduction in electricity losses of the power grid in the main consumption center of Chad – the capital city of N’Djamena.

45. Adaptation CCB of the Project will be supported by applying tailored design and technologies to enhance the resilience of transmission and distribution infrastructure built under the Project to climate risks facing the power sector of the two countries. These include: (i) avoidance of the areas subject to increased flooding risks in Cameroon, in particular the Reservoir du Maga and Fleuve du Lagone; (ii) appropriate design for the foundations of towers on transmission lines (chimney extension) and adequate draining system of substations platform for flood risk in Cameroon; and (iii) design, supply and installation of adapted equipment (conductors, transformers, HV and MV switchgear, etc) with specific requirements for extreme high temperatures in Chad and Cameroon. Furthermore, assistance provided to the project implementation entities – SONATREL and SNE – will help these entities increase capacity with respect to design and operation of power sector assets adapted to climate risks.

46. Increased electricity access and improved reliability of supply will help beneficiary households²³, especially poor and vulnerable, better adapt to and withstand climate risks, for instance, through better access to clean water, access to broadband, and during the COVID-19 recovery phase, access to economic and income-generation activities. In addition, adaptation benefits through the Project will include improved health care as hospitals and clinics will receive power required to maintain refrigeration for vaccines and the operation of life-saving equipment. Further details on project CCB are provided in Annex 6.

²³ This includes estimated 50,000 households in N’Djamena that will gain access to electricity and another 50,000 households the city that will benefit from improved electricity services.



C. Project Beneficiaries

47. Direct project beneficiaries include all existing and prospective electricity customers in Cameroon and Chad, who will benefit from expanded, more sustainable and cost-efficient electricity supply.

48. In Cameroon, the Project will enable hydropower supply from the South to accommodate unserved demand in the North at the lowest cost. Furthermore, hard currency revenues accruing to Cameroon from electricity exports and wheeling services, will help improve the financial bottom line of the two companies and reduce arrears within the sector. Power trade will also provide resources for investments geared towards improving services and expanding connections, implicitly benefitting both the existing and new electricity consumers in the country, contributing to improved resilience.

49. In Chad, the Project will critically contribute to the expansion of electricity access and lowering electricity costs as the country is going to diversify electricity supply away from imported diesel. Large economic and social benefits will accrue to Chadian people and businesses spanning across generations, as life standards and productivity in the country improve. Electricity imports from Cameroon will reduce SNE's operating costs and therefore the need for government subsidies, with large positive impact on public finances. More importantly, lower energy costs will allow to reduce and stabilize end-user tariffs, reducing hardship on poor vulnerable households and costs faced by businesses. Furthermore, support under the Project will help improve SNE's operational performance, raising the utility's investment capacity and ability to provide quality service to its customers.

50. The Project will have positive externalities spilling to the whole CAPP region once the first regional interconnector is brought in line. This will serve as a first milestone towards building a series of regional projects, providing lessons and experience on institutional arrangements and power trade agreements. The increased use of electricity from renewables will reduce the carbon footprint of electricity generation, with environmental benefits spanning globally as the Project contributes to the global commitment to reduce GHG emissions.

D. Theory of Change

51. Cameroon's large and lower-cost energy resources, and notably hydropower resources, provide a cost-effective means to bring affordable modern energy services to households and businesses in Cameroon as well as neighboring Chad, a key ingredient to poverty alleviation and enhanced resilience to shocks arising from climate change and pandemics. The interconnection of the power systems of the two countries will also pave the way to further regional integration of national electricity networks within CAPP. The results chain is summarized in Figure 3.

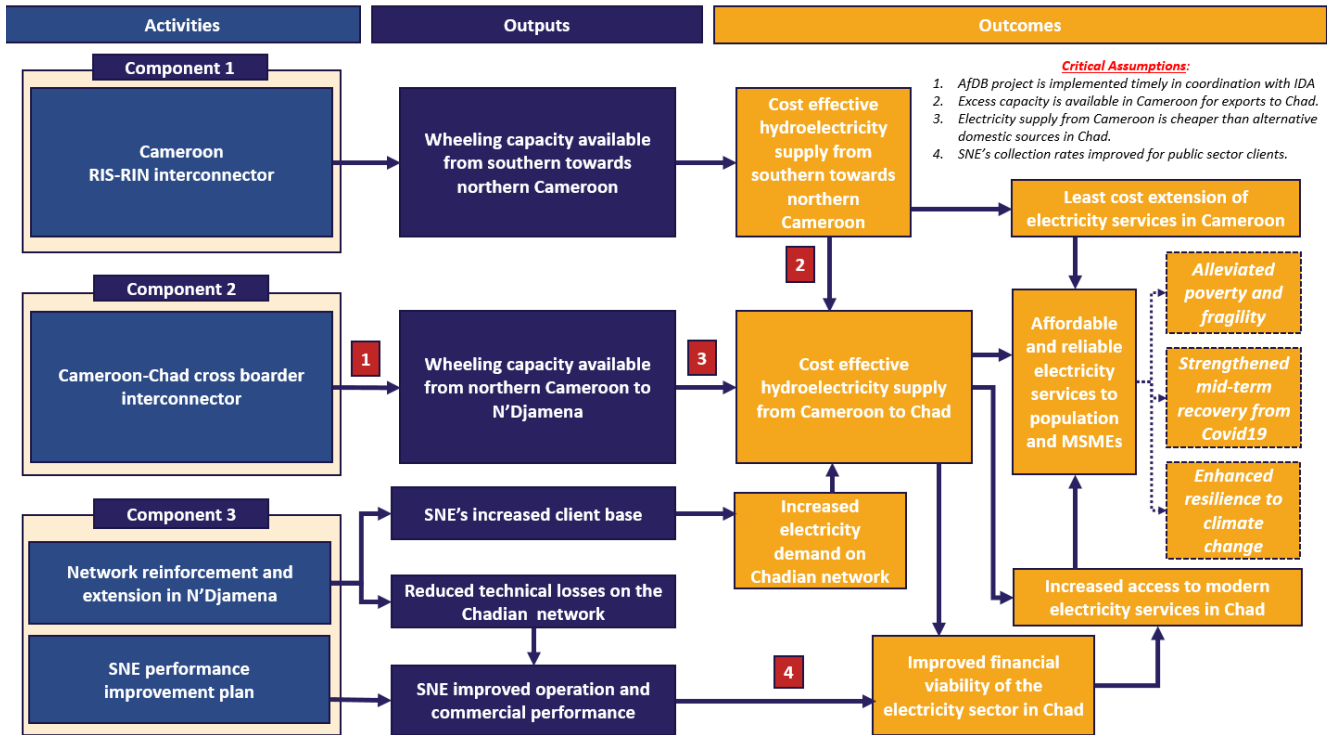
52. The assumptions that justified the proposed Project are that: (1) an excess capacity in Cameroon is available in the foreseeable future for exports to Chad through the proposed cross-border interconnector; and (2) the electricity supply from Cameroon is the least-cost option for baseload capacity in Chad, *ie.* below alternative domestic generation sources, notably thermal. As per the electricity supply-demand balance analysis presented in Annex 3 and the economic analysis presented in Annex 4, those two critical assumptions should reasonably be met by project completion. Another critical assumption related specifically to Chad is that (3) payments of electricity bills by public sector clients, accounting for 28.6 percent of electricity consumption²⁴, will significantly increase. The upcoming Energy DPF series in Chad would contribute to meet this assumption by supporting the setting up of a mechanism ensuring timely payment of electricity bills by the central government and public institutions. (4) SNE's financial situation is expected to improve as a result of the grid strengthening and expansion in N'Djamena together with the performance improvement plan implemented under Component 3. Key expected results of the plan are reduced losses and improved electricity payment collections.

²⁴ 2017 data. Source: World Bank, Chad power sector note, June 2018



53. Finally, the achievement of Project’s outcomes also depends on the timely implementation of AfDB financed activities on the cross-border interconnector (Component 2). To mitigate the risk induced by AfDB co-financing, both IDA and AfDB-financed activities will be implemented under the same institutional arrangements with joint supervision throughout implementation (see Annex 1).

Figure 3: Results Chain



E. Rationale for World Bank Involvement and Role of Partners

54. **Transmission infrastructure is best financed through public resources to address market barriers that may prevent private investments in generation.** Transmission is by definition less suitable for private investment because of its typical features that resemble those of a monopoly market. This is even more the case for cross-border transmission lines, which in all power pools in Africa have been mostly publicly financed. In a nascent power pool such as CAPP, private sector appetite for this kind of investments is naturally limited in the absence of an enabling regulatory framework at the country level and regionally, and due to the weak financial condition of the utilities and power companies involved, as well as the lack of political engagement. In Chad, SNE is solely responsible for network expansion and interconnection to regional markets and access to the World Bank’s most concessional financing is key to meet the needed services investments. Similarly, SONATREL in Cameroon remains a newly established state-owned enterprise, also very much in need of external financing for investments. The availability of a capable national transmission network is key to unlocking private investment in large hydropower plants, which the World Bank has long supported in Cameroon, in sync with IFC and MIGA. The guarantee that power produced by IPPs can be sold will improve the risk profile of IPP transactions and their bankability, which in return will result in better contractual terms and a fairer risk allocation for all stakeholders involved.

55. **The proposed Project builds upon long-term experience and continued engagement of the World Bank in supporting capacity building and construction of physical infrastructure in the regional markets.** The World Bank has



been in the forefront in supporting power system integration in Africa, providing financing and technical assistance to all power pools in Africa. In particular, the World Bank has been a leading development partner of West Africa Power Pool (WAPP) and the Eastern Africa Power Pool (EAPP) since their inception, often convening a wider group of donors, and equally supporting hard and soft infrastructure. In the Southern African Power Pool (SAPP) region, the World Bank is funding investment planning and preparation of selected priority regional energy projects.²⁵ The World Bank is also financing the Zambia-Tanzania Transmission Interconnector (P166099, connecting EAPP and SAPP, creating what could be the largest geographically interconnected region in the world.

56. The World Bank has unique experience worldwide supporting power sector reforms, utility performance improvement programs and electrification investments. The added value of the World Bank derives from its ability to deploy a diversified and tailored energy sector program, working in coordination with IFC and MIGA, to address the interrelated energy sector challenges in a coordinated manner. In Cameroon, the proposed Project is part of the World Bank's wider engagement, where policy dialogue, technical assistance, advisory services and lending are arranged in complementarity with one another to address key sector issues and the related effects along the value chain. In Chad, the World Bank brings the value of its global experience in the design and implementation of projects targeting utility performance improvements. Over the past years, the World Bank has developed a distinctive approach to help power utilities improve their commercial capacity and lift their financial standing through RPPs. RPPs have been deployed successfully in several countries and demonstrate the World Bank's added value in designing fit-for-purpose, pragmatic yet impactful solutions to improve utility performance.

57. The proposed Project is instrumental to complete financing and enable implementation of the AfDB-financed Cameroon-Chad Power Interconnection Project. The IDA grants provided to Chad will cover the funding gap for the section of the interconnection line within the country's borders; thus, allowing the Project to move forward after two years of impasse. Besides the co-financing arrangement for the construction of hard infrastructure, the World Bank and AfDB will share the costs of the OE, who will oversee implementation of the cross-border interconnection. The implementation arrangements are intended to ensure a smooth interface between the RIS-RIN and the cross-border interconnections, and the World Bank and AfDB will coordinate closely supervision throughout project implementation.

F. Lessons Learned and Reflected in the Project Design

58. The design of the Project has benefitted from lessons learned from other regional power network interconnector projects financed by the World Bank²⁶ as detailed below.

59. Strong political commitment needs to be established at the onset. Efforts were made to convene decision makers and stakeholders in both countries and develop institutional and commercial arrangements that would solicit buy-in at all levels. Discussions at the political level had been initiated by AfDB and led to the approval of the Cameroon-Chad Power Interconnection Project. The proposed Project was discussed at the presidential level in Cameroon and support within the country was strong since the onset given the national relevance attributed to the RIS-RIN Interconnection. Thus, Cameroon authorities were leveraged to convene their Chadian counterparts and agree on institutional arrangements.

²⁵ International Development Association: Project Appraisal Document on a Proposed Grant in the Amount of SDR 13.2 million (US\$20 million equivalent) to the Southern African SAPP—Program for Accelerating Transformational Energy Projects, October 21, 2014, Report No. 86076-AFR.

²⁶ These projects include the North Core/Dorsale Nord Regional Power Interconnector Project (P162933); the Mozambique - Malawi Regional Interconnector Project (P164354); the WAPP - Côte d'Ivoire, Liberia, Sierra Leone, and Guinea Power System Re-development (P113266); and the Energy Sector Management Assistance Program Regional Power Sector Integration Lessons from Global Case Studies and a Literature Review, 2010.



60. **Preparation of key technical studies, safeguards assessments, and major procurement packages shall be advanced as much as possible to significantly speed up implementation.** Technical studies, safeguards instruments and draft bidding documents for the AfDB-financed Cameroon-Chad Power Interconnection were completed by the time preparation of the proposed Project began. Safeguards instruments, including fully developed ESIA for project-affected areas on both Cameroon's and Chad's sides are being updated to ensure compliance with the World Bank's safeguards policies. With respect of new infrastructure to be constructed under the Project, technical studies and safeguards analysis have been conducted as part of Project preparation. In Cameroon, preparation of the RIS-RIN Interconnection has been entrusted to the existing PIU established at SONATREL, which has proven technical and fiduciary experience. While the Project will be appraised based on a basic design of the RIS-Interconnector, the technical analysis will continue towards detailed design and preparation of bidding documents for an engineering, procurement and construction (EPC) contract. This has been a specific choice of SONATREL, to jumpstart implementation as soon as the Project is approved. Bidding documents are expected to be completed by Project approval and tendering can be started while the Project reaches effectiveness. In Chad, a project preparation advance was approved to finance: (i) the update and finalization of environmental and social safeguards instruments²⁷; (ii) project management support to SNE's PIU; (iii) the OE for network strengthening and densification in N'Djamena; and (iv) technical assistance to the Ministry of Energy for designing and implementing an electricity sector's turnaround plan.

61. **A project's institutional and implementation structure must be tailored to the circumstances of the power sectors of the countries involved and support must be provided to ensure adequate implementation capacity and oversight.** The experience of other regional power projects has shown that an adequate implementation model is dependent on country specific energy sector contexts and evolves with the depth of regional electricity market integration. Centralized institutional models, such as special purpose vehicles (SPVs), where a – public or private - ad-hoc entity is established to arrange financing for, develop and operate the regional infrastructure could be appropriate in an integrated regional market context, which is not the case of CAPP. With the Project being a public sector investment, and financing being provided on concessional terms to both countries, there is no need for a project finance exercise through an SPV. Also, instruments such as SPVs require legal and regulatory framework that does not yet exist in CAPP or at the country level. As a result, a simple, decentralized implementation structure has been agreed for the proposed Project. The decision to use separate PIUs has several merits. First, it will allow the two countries to maintain ownership of the cross-border line by their respective utilities. Second, a large part of investments, and notably the RIS-RIN Interconnection, are domestic and their implementation would have required a national PIU anyway. Finally, in Cameroon this arrangement has allowed to leverage the existing expertise set up at SONATREL, and in Chad a newly established PIU will provide capacity building to SNE. Nonetheless, the experience of the regional projects points at the need to ensure high-level oversight, and this lesson has been captured in the setting up of a joint ministerial committee and a joint technical committee to oversee the implementation of the cross-border interconnection, as well as the joint recruitment by SONATREL and SNE of a Common Owner's Engineer(COE to mitigate the interface risks between national PIUs during construction.

III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

62. SONATREL and SNE will be the implementing agencies for the Project's activities within their respective countries.

²⁷ Existing (AfDB-financed) ESMF and RPF instruments need to be updated to cover for additional IDA-financed investments in N'Djamena, while the ESIA, ESMP and RAP for the interconnector need to be finalized to fully comply with World Bank's safeguards policies and update PAPs census.



Specifically, SONATREL will be responsible for the construction and operation of the RIS-RIN Interconnection and the sections of the cross-border transmission line within Cameroon's borders. As public-owned transmission company with Transmission System Operator (TSO) functions²⁸, SONATREL is entitled to own and operate all transmission assets in the country and is remunerated through a wheeling tariff paid by generators in the power market. Similarly, SNE will construct and operate the cross-border transmission line within Chad's borders and the infrastructure needed to electrification expansion under the Project. As sole vertically integrated utility in Chad, SNE is bound to implement all investments in the energy sector across the value chain, although the entrance of new generators is envisaged by law. Nonetheless, the two countries have also agreed to set up a common governance structure to ensure overall coordination both at the political and technical level for the construction and operation of the cross-border Interconnection and to facilitate power trade between Cameroon and Chad.

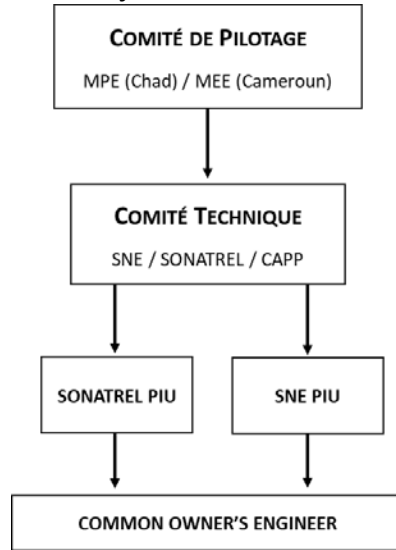
63. A Protocol Agreement signed by the two countries in 2009 first recorded the political commitment towards connecting their respective power systems. The Agreement envisaged the establishment of an Inter-State Steering Committee (*Comite de Pilotage, CdP*), a joint committee chaired in turn by the energy ministers of the two countries that would take strategic decisions and ensure overall oversight of the project. This provision has been reflected in the implementation arrangements identified for the AfDB-financed project and confirmed during preparation of the proposed Project. A CdP will be set up and placed under the joint authority of the Ministers in charge of energy of Cameroon and Chad to provide guidance on strategic and policy issues, as well as resolve issues requiring government decision. The CdP will comprise of representatives of the two ministries and the power sector regulators of the two countries and may be joined by other relevant ministers as the need arise. The CdP shall meet as and when required, but at least once per year during project implementation

64. A Joint Technical Steering Committee (*Comité Technique Cameroon-Tchad, CT*), placed under the joint authority of the Directors General of SONATREL and SNE, will provide project supervision across the two countries, monitor progress for reporting to the CdP and address technical issues as they arise. The CT may call upon ad-hoc technical expertise as required and will comprise a representative of the CAPP Permanent Secretariat. The CT shall meet as and when required, but at least quarterly per year during project implementation.

²⁸ The TSO is the entity responsible for operating, ensuring the maintenance of and, if necessary, developing the transmission system in a given area and, where applicable, its interconnections with other systems, and for ensuring the long-term ability of the system to meet reasonable demands for the transmission of electricity.



Figure 4: Project Institutional Structure



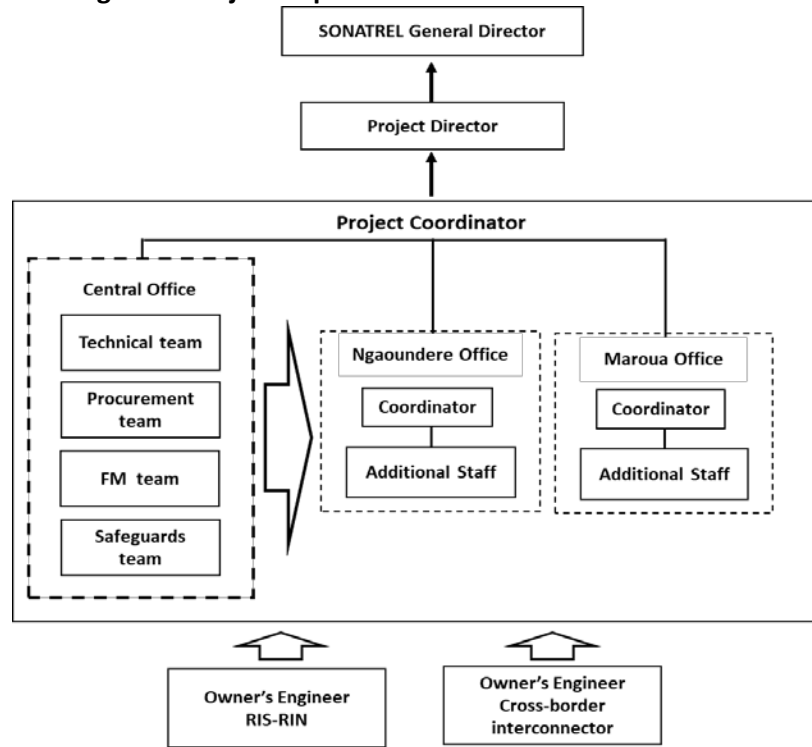
65. Furthermore, while the Project will be separately implemented by SONATREL and SNE (as detailed thereafter), the two companies will jointly recruit a single consulting engineer to serve as COE, entrusted with supervision of construction works for the cross-border interconnection from the Ngaoundere substation in Cameroon, to the Gassi substation in Chad, as envisaged under the AfDB project. Terms of references (ToRs) for the COE position will be approved by the CT, which will also supervise its selection; once selected, the COE will enter into two separate contracts with SONATREL and SNE. COE costs on SONATREL side will be covered under financing provided by AfDB and on the SNE side under the proposed Project. The COE will manage tendering activities and supervise the work of contractors from selection to commissioning, as well as provide technical advice to SONATREL and SNE and the CT as needed.

66. The Governments of Cameroon and Chad shall establish the Inter-State Steering Committee and the Joint CT no later than one month after effectiveness and provide the list of members to IDA.



Project implementation in Cameroon

Figure 5: Project Implementation Structure in Cameroon



67. On the Cameroon side, the Project will be implemented by SONATREL through the establishment of a PIU (Figure 5). SONATREL’s General Director will be responsible for overall oversight of the Project, ensuring timely and effective construction and operation of the RIS-RIN Interconnection and the cross-border Interconnection, in coordination with project counterparts in-country and in Chad, as well as providing reporting to MINEE and other interested Government authorities. A senior SONATREL staff will be appointed as Project Director (PD) and provide close project supervision, reporting back to the General Director.

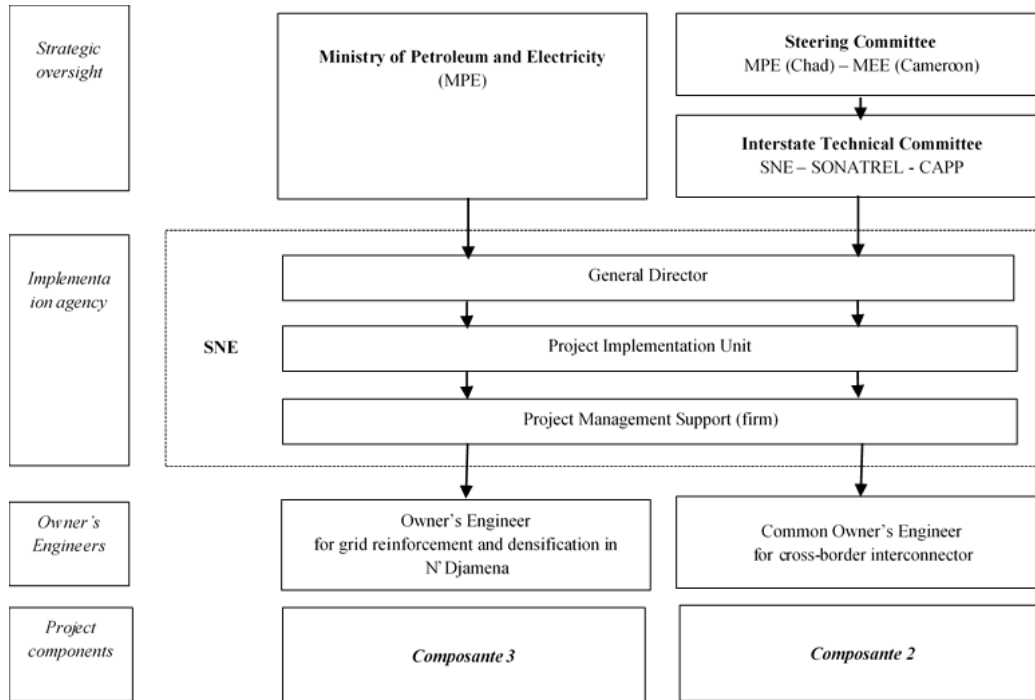
68. The PIU will include a central office in Yaoundé and two local offices in Ngaoundere and Maroua respectively, given the distant locations involved. The PIU will be headed by a Project Coordinator (PC) and shall include at minimum the following personnel: (i) a seasoned Procurement Specialist (PS); (ii) a Financial Management Specialist (FMS); (iii) an Accountant; (iv) an Environmental Specialist (ES); (v) a Social Development Specialist (SDS); (vi) a M&E Specialist; (vii) a Technical Coordinator; and (viii) two Coordinators, of for each local offices. Fiduciary functions will be concentrated in the central office. Additional technical expertise is expected to be needed, ideally to be assigned from SONATREL, or recruited with project funds during project implementation. Finally, SONATREL shall make available support and administrative staff for both the central and local offices, to minimize recruitment under the Project. The PIU will work under PD’s oversight and have responsibility for the day-to-day management of the Project, including: (i) ensuring the timely implementation of the Project in accordance with the Project Implementation Manual (PIM); (ii) preparing annual work plans and budgets and annual procurement plans for submission to the World Bank for approval; and (iii) assuming overall responsibility for, inter alia, fiduciary tasks such as procurement and financial management (FM), compliance with the World Bank’s environmental and social safeguards, and also M&E, communication and citizen engagement. PIU staff will work closely with SONATREL departments to handle legal, technical, economic and financial issues as well as those



relating to communication and public relations. It is expected that PC, PS, FMS, ES and SDS be in place by effectiveness. SONATREL will also recruit and mobilize an OE (SONATREL OE) to supervise preparatory and construction works for the RIS-RIN Interconnection and to interface with the COE jointly appointed by SONATREL and SNE to supervise the cross-border interconnection. SONATREL OE will be selected competitively and financed under the Project.

Project implementation in Chad

Figure 6: Project Implementation Structure in Chad



69. On the Chad side, the Project will be implemented by the Chadian SNE. SNE has established a PIU reporting to senior management²⁹, which will be staffed with essential personnel, including technical, project management, procurement, FM, environmental and social safeguards. In the short term, the PIU will require support virtually in all areas of project implementation given that SNE does not have experience with World Bank-supported projects and faces severe capacity constraints. To this end, the PIU will be supported by a Project Management Support (PMS) consultancy firm, located in-house that will work in tandem with the SNE PIU (Figure 6). This arrangement will provide SNE with the required skill mix to implement project activities without delays. It will also enable the transfer of project management expertise to SNE and its PIU through PMS support and learning by doing, so that they could take over project management responsibilities within three years from the beginning of project implementation. The PMS consultant will be procured and contracted through the preparation advance and will be in place before project effectiveness. The mobilization of the PMS team within SNE’s PIU is a condition of effectiveness for the grant agreement with Chad. The PIU will be supported by: (i) an OE to supervise the implementation of Component 3; and (ii) the COE for supervision of the cross-border interconnection.

70. PIMs will be prepared by SONATREL and SNE and approved by the World Bank. The PIMs will provide guidance on project implementation arrangements at the level of each country, and notably on roles and responsibilities within the

²⁹ Cellule de Conception et de Gestion des Projets, reporting directly to SNE’s General Manager.



implementation units set up by SONATREL and SNE, as well as on the technical, administrative, financial and accounting procedures, procurement arrangements, and the safeguard measures adopted by the two agencies, in accordance with the respective national laws and regulations.

71. **Joint supervision with AfDB.** The World Bank and AfDB will coordinate closely throughout project implementation, to ensure timely execution of investments related to the cross-border line. The final design of the line will build on the analysis conducted for the RIS-RIN Interconnection and notably the optimization analysis, which has been closely coordinated between the two institutions to guarantee the interface between the RIS-RIN Interconnection, the cross-border line and all other transmission investments in the RIN financed by the World Bank. Joint supervision will be ensured through joint missions and coordination in the dialogue with stakeholders in both Cameroon and Chad.

Commercial contracts for electricity trade

72. Cameroon and Chad will trade power based on two contracts: (i) a PPA for the sale of electricity; and (b) a TSA for provision of wheeling services. With regard to the PPA, while SNE will clearly be the off-taker, the seller on Cameroon's side remains to be defined. As of today, ENEO appears to be the only company with enough electricity supply – either owned or purchased from IPPs – to accommodate electricity exports to Chad on a sustained basis, although it would need to obtain an export license from ARSEL. Following the 1998 Electricity Law and the liberalization of the power market in Cameroon, virtually any producer, and notably future PPPs or IPPs, could sell electricity for exports, subject to obtaining an export license. Also, the situation in the generation sector remains fluid, as new power plants are expected to come in line under different ownership arrangements. As Cameroon's TSO, SONATREL is the company entitled for providing wheeling services under the TSA for the power purchased by SNE. Nonetheless, the parties of the TSA remain to be established as well. SNE has indicated the preference to sign a contract only with one entity on the part of Cameroon. Therefore, the PPA and TSA may be bundled into one contract, with the arrangements allowing for remuneration of SONATREL for wheeling services and passing the power purchase costs to the seller through payments made by SNE via the PPA (PPA at the border).

73. The GoC is expected to formally designate the signatory entities of the PPA and TSA based on consideration of: (i) ownership of available and planned generation capacity; (ii) existing and planned contracts for the use of such capacity; and (iii) implications of different arrangements in terms of security and selling price of electricity supply for exports as well as returns to the GoC. In doing so, the GoC shall take into account the evolving circumstances of Cameroon's power sector. Specifically, power trade arrangements should align with the long-term market structure where a number of new entrants, and notably IPPs, are expected, with implications in terms of availability of power supply, energy unit costs, access to the network. In this context, a single-buyer model, or similar to it, may be needed, and aggregation of exports and imports shall be considered, especially in light of Chad's plans to develop significant solar generation capacity. It should be noted that as Cameroon's power market evolves, there is the possibility that new PPAs are signed between incoming electricity producers, including IPPs, and SNE. Thus, the GoC should specify the agreements between the entities appointed to enter contracts, as well as vis-à-vis SNE, concerning wheeling services and the related charges. Finally, mechanisms for ringfencing returns from exports will be defined.

74. Discussions between Cameroon and Chad concerning commercial arrangements for electricity exports are ongoing. While the exact terms are contingent upon the decisions above to be taken by Cameroon and will be determined during power trade negotiations, there is a clear understanding that SNE's demand will not be lower than 100 MW (or equivalent), which can be easily accommodated by Cameroon as confirmed by technical analysis. Concerning prices, the margin for an agreement is large, given the significant differences in the bulk costs of electricity between Cameroon and



Chad. Return projections based on different assumptions of volumes sold and prices are presented in detail in the economic and financial analysis attached as Annex 4.

75. The designation by the GoC of the entity that will enter a PPA with SNE and the definition of arrangements for wheeling services is a disbursement condition. A term-sheet that defines the main conditions of the PPA signed by the designated entity on the Cameroon's side and SNE on the Chad's side shall be submitted to the World Bank no later than six months after effectiveness.

B. Results Monitoring and Evaluation Arrangements

76. **M&E will be managed by SONATREL and SNE PIUs for Cameroon and Chad activities respectively.** Designated PIU team members will be responsible for all aspects related to the M&E of the Project, as per the provisions included in the PIMs. Specifically, M&E will entail: (i) monitoring physical progress; (ii) carrying out M&E of delivered outcomes; (iii) reviewing and supervising the environmental and social issues identified and any mitigation measures; and (iv) providing guidance to the implementation team in early identification and resolution of any issues identified.

C. Sustainability

77. **The Governments of Cameroon and Chad are committed to this flagship Project that would kick off regional integration of national electricity systems and pioneer mutually benefitting electricity trade among CAPP countries.** The provision of the commercial contracts, including the PPA and TSA will ensure the availability of resources needed to properly maintain and operate the cross-border transmission assets in the Cameroon territory. The HV transmission infrastructure on Chad's territory would be the backbone for further extension of the interconnected network, notably towards the southern part of the country, where most of the population is located. Improved financial viability of the electricity sector in both countries would enable SONATREL and SNE to finance the required maintenance of transmission assets.

78. **Mutually agreed and transparent terms of electricity trading are key to the sustainability of the Project.** The PPA and wheeling agreement to be entered into by Cameroon and Chad are the first in CAPP and the power pool agencies lack the capacity to provide adequate advisory and regulatory guidance. Furthermore, while commercial contracts for off-take and transmission of electricity are more of a practice in Cameroon, SNE lacks any experience in this area. For contracts to be sustainable over the long term, it is pivotal that negotiations on the terms of electricity trading take place on an equal footing; that all parties understand the liabilities they are incurring, and benefits and risks are fairly allocated. The World Bank has played a key role in facilitating this process, providing sample PPA contracts developed for other regional power trade contracts, as well as sharing lessons and best practices. Transaction advisory services for the parties involved in the PPA will also be financed under the Project.

IV. PROJECT APPRAISAL SUMMARY

A. Technical, Economic and Financial Analysis (if applicable)

(i) Technical Analysis

79. Feasibility analyses have been conducted by reputed international engineering consultancy firms for the RIS-RIN



Interconnection in 2020³⁰ and for the Cameroon-Chad Interconnection in 2017³¹, prior to approval of the AfDB project.

80. Both analyses have validated, and where needed, updated the electricity demand supply forecasts provided by PDSE, concluding that demand for electricity will increase significantly in Cameroon and Chad over the medium- to long-term. Cameroon's energy needs will more than double over the next fifteen years; the GoC plans to meet them mostly through hydropower (accounting for more than 90 percent), complemented with gas fueled power generation, while phasing out other sources of thermal generation (HFO/light-fuel oil (LFO)/diesel). Cameroon's southern power system is expected to add 1.3 GW of hydropower capacity in the near future. As a result, the power system spanning from RIS to RIE (RIS+RIE) has an energy supply potential well in excess of demand. Conversely, in the RIN, hydropower supply is consistently below or just enough to cover demand, requiring the use of expensive emergency diesel generators. The RIS-RIN Interconnection will allow to transfer to the RIN the excess supply of the RIS+RIE, including significant hydropower from 2028 onwards. All feasibility analyses estimate electricity import demand from Chad not to exceed 200 MW (equal to 1,752 GWh/year), which will nearly triple the currently available generation capacity in the country. Accordingly, the expected maximum transfer capacity of the Cameroon – Chad Interconnector is 200 MW. As a conservative estimate, the feasibility study conducted for the RIS-RIN Interconnection has shown that after accommodating all domestic needs, Cameroon will have enough supply to export 50 MW to Chad starting from 2028-2029, subject to the availability of a high voltage transmission line to evacuate new hydropower IPPs expected to be commissioned in Sanaga river valley based on prioritized list of hydro power projects being prepared through Hydropower Development on Sanaga river TA (P157733). Sensitivity analysis has further confirmed that even with increased domestic demand in Cameroon, electricity exports will be guaranteed. Electricity imports supply from Cameroon will enable Chad to displace HFO and diesel generation. Specifically, the volume of HFO/diesel-based supply needed over the period from 2028 to 2035 would be 27 percent less thanks to the Project. Annex 3 provides a detailed electricity supply-demand balance analysis that demonstrates the viability of power trade between Cameroon and Chad.

81. As part of feasibility analyses, network system analyses have been carried out³², including load flow and dynamic simulations. For the RIS-RIN Interconnection, a pre-design has been completed, and the technical analysis will continue towards defining detailed design and preparing tendering documents. For the cross-border interconnection, a full feasibility analysis has been developed and tender documents have been prepared. In both cases, a technical and economical comparison was performed to assess the optimal corridor of the lines, taking into account costs, project-related risks, environmental and social risks, operational and maintenance risks, and potential to increase electricity access for settlements close to the new transmission lines as key decision criteria.

82. As part of feasibility analysis for the RIS-RIN interconnection, an analysis of all interconnection projects³³ has been carried out to explore optimization of the investments on the RIN network. This has concluded that the optimization of investments in North Cameroon would allow a 12 percent reduction of costs across the various projects, and notably for the cross-border line, solving a gap that has recently emerged on the AfDB financing in Cameroon.

83. The Project will use well-established technologies (i.e. 225 kV alternating current lines for the interconnection, and optical fiber ground wire for high speed telecommunication) and presents no unusual construction and operational

³⁰ Rapport Avant-Projet Sommaire Interconnexion RIS-RIN ; IED ; February 2020.

³¹ Étude du projet d'interconnexion des réseaux électriques du Cameroun et du Tchad ; Hatch-Artelia; June 2017.

³² For the RIS-RIN interconnection: see *Rapport Avant-Projet Sommaire Interconnexion RIS-RIN* ; IED ; February 2020. For the Cameroon-Chad interconnector : see *Étude du projet d'interconnexion des réseaux électriques du Cameroun et du Tchad* ; Hatch-Artelia; June 2017.

³³ including the Chad-Cameroon 225 kV Interconnection financed by AfDB, the 225 kV Reinforcement of Garoua and Maroua financed under the World Bank-financed ETRP; the Bini-Warak power plant project financed by Syno Hydro Company, the electrification between Maroua and Yagoua under the World Bank-funded REAPUR, as well as the interconnection project with Nigeria.



challenges in similar conditions. The equipment and the technologies needed for construction and operation of transmission lines and substations are well known and tested in the region. Cost estimates have been appraised and are deemed to be in line with current market prices. Estimates include a contingency of 10 percent, which has been chosen to reflect the possibility of cost increases due to: (a) final route alignment; (b) adaptation of final/approved design during construction works mainly for the foundations; and (c) security risks due to the fragile situation in some of the areas traversed by the identified corridor. Owner's Engineers will be contracted under the Project, and all will be reputable international engineering companies, which will help ensure that construction is carried out in accordance with designs and international quality standards. Technical aspects of the infrastructure to be built under the Project are summarized thereafter. A full technical analysis is presented in Annex 2.

84. **RIS-RIN Interconnection.** A 518 km long double-circuit 225 kV (alternating current) transmission line will connect the RIS and the RIN with four substations along the chosen corridor. The optimal route has been identified as: Nachtigal/Ntui - Yoko - Tibati - Hourou Oussoua. The upcoming Nachtigal Hydro Power Plant (HPP) will be connected to the new Nachtigal substation. The double-circuit towers will be of the lattice type with two shield wires: one classical steel conductor and one OPGW for protection, control, and communication. The two circuits will have a two-bundle aluminum conductor (Astor 570 mm²). The four new 225/30 kV substations (Ntui, Yoko, Tibati, and Hourou Oussoua) will be of the outdoor open-terminal type, with a control building containing all the auxiliary equipment, and a dedicated SCADA Substation Control and Monitoring System (SCMS) and Telecommunication system. The Project will also install the required voltage regulation (compensation for reactive power) equipment, as identified during the feasibility study, in two of the new substations along the RIS-RIN interconnection. The static study confirmed that under steady state conditions the voltages remains within 5 percent of their nominal values, available generators remain within 80 to 100 percent of their rated capacity, and current limits are respected. The design of the RIS-RIN has been selected in a manner to ensure mutual optimization with ongoing expansion of transmission infrastructure in Cameroon financed under REAPUR and ETRP. Project preparation has used resources available under ETRP and the capacity of the PIU established under that project and housed within SONATREL.

85. **Cameroon-Chad Interconnection.** The Interconnection will be a 1,024 km 225 kV (alternating current) transmission line connecting Northern Cameroon with Chad. The line consists of three parts: (i) a double-circuit 225 kV line from Hourou Oussoua, Garoua to Maroua (Cameroon); (ii) a first single-circuit 225 kV line from Maroua (Cameroon) through Bongor, Guelendeng and Gassi (Chad); and (iii) a second single-circuit 225 kV line from Maroua (Cameroon) via Kousseri to Gassi (Chad). The towers will be of the lattice type with two shield wires: one classical steel conductor and one OPGW for protection, control, and communication. The conductor in each circuit is an aluminum conductor (Astor 570 mm²). The maximum transit power for export is expected to be 200 MW under normal conditions. The Interconnection will require construction of four new substations of the outdoor open terminal type, the extension of four substations and the installation of associated equipment for dynamic voltage regulation (SVC equipment). Two of the four new substations are in Cameroon: Garoua 2 and Kousseri. The remaining two (Gueledeng and Bongor) are in Chad. The following substations will need extension: Hourou Oussoua, Garoua existing and Maroua (Cameroon) and ii) 90 kV substation at Gassi (Chad). Each new substation will include line bays and a double busbar system, transformer bank, and equipment for protection, metering, communications and a SCADA system.

86. Rural electrification along the cross-border interconnection is financed under the AfDB project on the Cameroon's side and under the Project on the Chad's side, which will help ensure that communities along the Interconnection are set to gain from the Project. Overall, about 478 localities will be electrified through the deployment of 30 kV networks.

87. **RIN Optimization.** The objective of the optimization analysis was to ensure the most efficient configuration of RIN



between the different ongoing projects. The conclusion has been that the optimization will save costs without modifications to the scope and to the results of critical projects and notably rural electrification financed by the World Bank. The optimization will mainly enable AfDB to close the US\$70 million gap emerged on their financing to Cameroon for the Cameroon-Chad interconnection project. In addition, this optimization has the advantage of: (i) improving the stability of the network and reducing the level of reactive power; (ii) minimizing environmental and social impacts as 212 km of 225 kV lines, and 110 km of 90 kV lines and one substation will be avoided; and (iii) reducing the land to be acquired from project-affected people (estimated value at US\$21 million). This RIN optimization was adopted by all the concerned stakeholders and the breakdown of the different investments in Table 2 of Annex 1 was approved.

88. **Electricity access expansion in Chad and SNE's performance improvement.** The Project will help increase electricity access in and around N'Djamena by: (i) strengthening the transmission and distribution grid; and (ii) extending and densifying the distribution network. The HV substations of Gassi and Lamidji will be reinforced with one 90 kV/15 kV transformer and four connections to the MV network to strengthen the transmission network. The extension and densification of the distribution network aims to add 50,000 new connections, which will double the electricity access rate in N'Djamena. In addition, the Project will help automatize the distribution grid through the installation of remote terminal units and telecommunication equipment in MV/LV stations, as well modernize the distribution load dispatch center through the installation of a SCADA system and a dedicated distribution management system (DMS) to improve security of supply.

89. State-of-the-art corporate systems, which constitute the most tested, basic tools to help improve a utility's operation and commercial performance, will support the implementation of a performance improvement plan for SNE. These include: (i) a GIS; (ii) an ERP software; and (iii) a new meter data management software for the operation of smart or prepaid meters (target: 100,000 meters).

(ii) Economic Analysis

90. The Project's economic analysis builds on a standard cost-benefit methodology, which compares the present value of incurred costs to the stream of attributable benefits under two scenarios, i.e., the "with Project" and "without Project". The Economic Internal Rate of Return (EIRR) and Net Present Value (NPV) so calculated provide a measure of the Project's viability over its economic lifetime assumed to be 15 years.

91. **Benefits.** The measurable economic benefits of the project include: (i) cost savings from the displacement of diesel generation in the North of Cameroon; (ii) electricity access expansion in North Cameroon; (iii) displacement of HFO/diesel-based generation in Chad equivalent to imports from Cameroon; (iv) increased electricity access in Chad; and (v) reduction in technical network losses in Chad. In addition to these direct benefits, the Project presents some indirect benefits which are difficult to predict and quantify. These include the impact of the Project on economic activity, improved network stability in Chad, and improved service delivery and operations on the part of SNE as a result of Technical Assistance activities. Thus, these benefits are discussed, but not included in the economic evaluation.

92. **Costs.** The main costs considered in the economic analysis are the capital cost (CAPEX) and the operating costs (OPEX) associated with transmission and distribution infrastructure to be built under the Project, as well as the cost of generating the additional electricity consumption enabled by the Project, project management costs, connection costs and resettlement compensation costs. Operation costs are estimated as 2 percent of CAPEX for the substations and 1 percent of CAPEX for the lines and other equipment.



93. **Results.** The economic analysis indicates a strong economic rationale for the Project, which is expected to generate an NPV of US\$1,797 million and an EIRR of 20 percent without climate benefits. The hurdle rate of the EIRR is crossed in 2033 when this is estimated at 7 percent. With climate benefits, the NPV and EIRR would increase to US\$1,983 million and 21 percent respectively under the low carbon price scenario, and to US\$2,714 million and 22 percent respectively under the high carbon price scenario (Table 2).

Table 2: Summary Results of the Economic Analysis of the Cameroon- Chad Interconnector

Discount rate	6%
Economic rate of return	
Project ERR without Climate Benefits	20%
Project ERR with Climate Benefits (Low Carbon Price Scenario)	21%
Project ERR with Climate Benefits (High Carbon Price Scenario)	22%
Composition of NPV	
Project capital cost	US\$596.29
Project O&M Costs	US\$78.96
Connection Costs	US\$333.1
Cost of Generation for Marginal Demand	US\$249.8
Total Costs	US\$1,045.21
Economic Benefits of fuel Displacement in RIN	US\$1,349.94
Economic Benefits of New Connections in RIN	US\$14.29
Economic Benefits of Fuel Displacement in Chad	US\$1,416.77
Economic Benefits of new Connections in Chad	US\$0.09
Economic Benefits of Reduced Technical Losses in Chad	US\$60.69
Total Economic Benefits	US\$2,841.78
Project NPV before Environmental Benefits	US\$1,796.57
Project NPV with Environmental Benefits (Low Carbon Price Scenario)	US\$1,982.83
Project NPV with Environmental Benefits (High Carbon Price Scenario)	US\$2,713.56

94. **Sensitivity Analysis.** Sensitivity analyses have been conducted to test the robustness of results against two major contingencies that may affect the Project: (i) delays in the development of planned hydroelectric capacity in Cameroon and (ii) substitution of HFO/diesel in Chad with other thermal sources that are not as cost-effective as hydropower. Delays in the development of planned hydroelectric capacity in Cameroon are expected to result in a reduction of the NPV of the Project to US\$1,630 million and of the EIRR to 19 percent. In addition, in order to meet the contractual obligations to Chad, Cameroon may be obliged to retain more expensive gas capacity scheduled for retirement, and the higher marginal cost of such generation sources would imply a higher electricity prices in Cameroon at the expense of consumers. In case Chad decides to convert existing diesel plants in its generation portfolio to HFO plants, there would be a reduction in cost of fuel for power generation and a corresponding reduction in economic benefits. Nonetheless, the Project would remain economically viable with an NPV of US\$1,057million and an EIRR of 15 percent.

95. **Economic Impacts of COVID-19 pandemic.** Further sensitivity analysis has been conducted to assess the impact on the Project’s economic viability due to the global recession expected in the aftermath of the pandemic as well as to the related collapse of oil prices. While the depth and duration of the recession cannot be fully determined, the World



Bank (2020) assessment of the impact of COVID-19 on SSA countries categorized the economic impact on Cameroon as relatively moderate over the long term, based on the country's relatively low trade with China, its low percentage of remittances as a percentage of GDP, and low international tourism receipts as a percentage of total exports. Also, it is reasonable to expect that the effects of the pandemic would be minimized by the time of Project commissioning, based on the current expectations on infection rates and mortality levels. Given the expected commissioning date of the Project and the unavailability of new oil price projections under these circumstances, an informed assessment of how the current oil market dynamics could affect the Project cannot be made. However, a sensitivity analysis has been carried out assuming a theoretical scenario under which the decrease of crude oil prices results in a reduction in generation costs by 50 percent in Cameroon's northern power system and Chad. The analysis estimates that the Project remains economically viable with an NPV of US\$356 million and an EIRR of 10 percent.

(iii) Financial Analysis

96. The financial analysis of the Project takes into consideration the investment costs and the cash flow expected to be generated from the overall Project.

97. Cash outflows are represented by: (i) the investment costs; (ii) operating and maintenance costs estimated at 2 percent of capital costs; and (iii) incremental cost of generating additional electricity in Cameroon and Chad. The Weighted Average Cost of Capital (WACC) of the Project was derived taking into account the credit, government equity and grant portion of the total financing. The WACC of 1.8 percent is used as the financial cost of capital.

98. **Benefits.** Financial benefits of the Project (cash inflows) derive from: (i) electricity exports to Chad; (ii) revenues from meeting constrained demand in northern Cameroon; (iii) revenues from increased access in Chad; and (iv) savings in generation costs from reduction in technical losses in the N'Djamena grid.

99. **Results.** Current unit cost of electricity generation in Chad is approximately US\$0.24/kWh (CFA 140/kWh). However, there are plans to convert up to 80 percent of diesel plants to HFO, which would lower the average domestic power generation cost to US\$0.19/kWh (CFA 110/kWh). Consequently, the benefits from the interconnector can be shared by both countries if the export price to be agreed in the PPA between Cameroon and Chad lies between US\$0.12/kWh and US\$0.19/kWh excluding wheeling charges. Given that a PPA is yet to be signed, the analysis uses US\$0.15/kWh as a base case and carries out sensitivities on changes in export prices. Also, wheeling charges are assumed to be US\$0.02/kWh (CFA 10.6/kWh) in line with ARSEL regulation on SONATREL's wheeling charges. The financial analysis of the Project under the base case export price scenario shows that the Project is financially viable with an NPV of US\$280 million and a financial rate of return (FIRR) of 5.1 percent. The Project remains financially robust with a FIRR above the hurdle rate under varying PPA export price assumptions.

100. The financial performance of the energy sector in Cameroon and Chad is dependent on the financial performance of the key stakeholders – ENEO, SONATREL and SNE. Despite being a profitable entity, ENEO is heavily burdened with a tightened cash flow position that has affected the overall health of the company. SONATREL on the other hand is a relatively new entity whose opening balance sheet is yet to be agreed upon. SNE is a financially weak utility highly dependent on subsidies from the Government of Chad.

101. A detailed financial analysis, including an analysis of the financial situation of the electricity sector in Cameroon and Chad is presented in Annex 4.



B. Fiduciary

(i) Financial Management

102. The Project will be implemented by SONATREL in Cameroon and SNE in Chad separately and so will be the FM arrangements. A fiduciary assessment of SONATREL and SNE was conducted to determine whether the companies have acceptable FM arrangements in place to handle the Project's fiduciary responsibility. The assessment concluded that the residual risk rating is **Substantial for both Cameroon and Chad**. The assessment was performed in accordance with the Directives and Policy for Investment Project Financing (IPF); the World Bank Guidance on FM in World Bank IPF Operations issued on February 28, 2017 and the guiding principles in risk assessment issued in April 2020. In doing so, the World Bank's team went beyond assessing the Borrowers' knowledge of the World Bank's fiduciary rules, to focus more on their track record in implementing previous World Bank-financed operations and related lessons. In particular, it was considered that: (i) SONATREL is relatively newly established; (ii) SNE currently has no experience with World Bank-financed projects and faces capacity constraints; (iii) the FM teams as part of the PIUs that will materially implement the Project are not yet set up; and (iv) the internal control environments in each company remain to be fully built. Mitigation measures have been defined with the aim to reduce the likelihood and/or impact of the identified risks.

103. In Cameroon, SONATREL's Director General will be responsible for overall oversight of the Project and the Project Director will provide close project supervision, reporting back to the Director General. The fiduciary aspects of the proposed Project, including FM aspects will be managed by the PIU to be created within SONATREL. Specifically, the PIU will: (i) ensure that funds are used for the purposes for which they were intended in an efficient and economical manner; (ii) correctly and completely record all transactions and balances related to the Project; (iii) prepare the Project's financial reports in an accurate, reliable and timely manner; (iv) secure the Project's assets; and (v) ensure that the Project will be subject to auditing arrangements acceptable to the World Bank. The Project will rely on the existing FM arrangements put in place to manage donor-funded Projects, which are housed within two main institutions:

- (i) the *Caisse Autonome d'Amortissement* (Autonomous Amortization Funds, CAA), which is equipped with dedicated tools developed by the World Bank Institutional Development Fund (IDF), comprising of a standardized FM Manual and an integrated FM system for donor-funded Projects (namely SIGED). The latter includes modules relating to the Project cycle; budgeting and accounting; automated payments, and electronic filing; and
- (ii) *The Ministry of Public Procurement (Ministère des Marchés Publics, MINMAP)*, which is responsible for ex-ante control of all suppliers' invoices associated with a contract prior to payment by CAA.

104. The following mitigation measures have been identified to ensure that the Project's FM arrangements satisfy the World Bank's minimum requirements under the World Bank's Policy and Procedure for IPF operations and provide, with reasonable assurance, accurate and timely information on the status of the Project as required by IDA:

- (i) Recruitment of FMS as part of the PIU prior to Project effectiveness and based on ToRs acceptable to the World Bank;
- (ii) Recruitment of a seasoned Accountant based on ToRs acceptable to the World Bank;
- (iii) The PIU shall adopt a Financial Procedures Manual as part of the PIM no later than one month after project effectiveness. Such Manual shall build on the standardized FM Manual of Procedures developed by CAA as well as the Manual of Procedures currently used under the ETRP, both to be customized to reflect the Project's specificities;
- (iv) The accounting software currently used for the ETRP, which is a multi-project and multi-location version, shall be configured to handle accounting and reporting needs under the Project;
- (v) SONATREL shall complete the set-up of its internal audit unit, which will be entrusted with the internal audit function at the Project level;



(vi) SONATREL shall submit ToRs acceptable to the World Bank for the external audit function, to be conducted by SONATREL's statutory auditor. The audit will consist of an annual financial audit of the financial statements of the Project and a review of the internal control system.

105. In Chad, the proposed Project will be implemented by SNE through its project implementation unit (SNE PIU) reporting to senior management, which will be equipped with all the skills needed for the proper project management. SNE is a State-Owned Enterprise, established by a decision of the shareholders meeting held on May 3, 2010. As detailed in paragraph 64, the PIU will be supported by a PMS consultancy firm.

106. The following mitigation measures have been identified to ensure that the Project's FM arrangements satisfy the World Bank's minimum requirements under the World Bank's Policy and Procedure for IPF operations and provide, with reasonable assurance, accurate and timely information on the status of the Project as required by IDA:

- (i) The PMS consultancy team shall include a qualified and experienced FM Specialist to be dedicated to the Project;
- (ii) The PIM and the Grievance Redress Mechanism (GRM) will be elaborated and adopted during the implementation period of the project preparation advance;
- (iii) Within five months after project effectiveness, SNE PIU shall appoint or recruit on a competitive basis a FM Specialist, an Accountant and an Internal Auditor to be dedicated to the proposed Project, which will be trained by the PMS consultancy firm on FM procedures;
- (iv) Within six months after effectiveness, SNE shall acquire and install a "multi-project" computerized accounting system to fit project needs and generate useful information and financial statements. Within the same period, staff shall be trained on using the system. Until this is in place, the team will keep records on Excel spreadsheet;
- (v) Within six months after effectiveness, SNE shall adapt and adopt the unified FM Procedures Manual in use for the other World Bank-funded projects implemented in Chad, to reflect the specificities of the proposed project. The Manual will describe the role and responsibilities of the implementing entity and the beneficiaries; the applicable fiduciary procedures; the reporting procedures; the funds flow arrangements and budget management cycle and procedures...etc.;
- (vi) Within five months after project effectiveness, SNE shall recruit an independent auditor, with ToRs and qualifications acceptable to the World Bank;
- (vii) Within six months after project effectiveness, SNE shall recruit reputable external auditing firm to conduct audit the Project's financial statements, based on ToRs agreed upon with the World Bank.

(ii) Procurement

107. **Applicable procurement rules and procedures.** In each country, procurement of goods, works, and non-consulting and consulting services for the whole Project will be carried out in accordance with the procedures specified in the 'World Bank Procurement Regulations for IPF Borrowers', dated July 2016 and as revised in November 2017 and August 2018 (Procurement Regulations); the Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants' (dated October 15, 2006 and revised in January 2011 and as of July 1, 2016 - Anticorruption Guidelines); and the provisions stipulated in the Financing Agreement.

108. Contracts to be financed by AfDB and the World Bank respectively, under separate procurement and following their respective procedures, have been clearly identified. There might be a need for the World Bank to cover part of the costs of a work contract in Chad that is expected to be financed by AfDB. This can only be confirmed at implementation stage. Furthermore, the COE entrusted with supervision of the cross-border interconnection will have to be jointly selected by SONATREL and SNE, based on ToRs agreed by the two implementing agencies, AfDB and IDA and resulting in the selection of a single firm to ensure consistency of the technical requirements. Shall the need arise, the World Bank



will explore the possibility to adopt AfDB's procedures to procure the work contract and the OE contract in Chad through an Alternative Procurement Arrangement (APA) agreement. If this is not feasible, the World Bank may consider the direct contracting of the firms selected based on AfDB's procedures, upon positive evaluation of the procurement process that has been carried out.

109. **The proposed Project will use the Systematic Tracking of Exchanges in Procurement (STEP) system.** STEP is a planning and tracking system, which will provide data on procurement activities, establish benchmarks, monitor delays, and measure procurement performance.

110. **Procurement risk assessments.** As part of the PRAMS exercise carried out by World Bank, the overall procurement risk of the Project is assessed as **High**. The main risks identified are:

- (i) Staff from implementing agencies involved in the Project may not have enough knowledge of the New Procurement Framework (NPF) and/or may confuse the NPF with former the Procurement and Consultant guidelines;
- (ii) Procurement personnel within implementing agencies with the experience required to effectively implement procurement actions on time and in line with World Bank's policies and procedures is not sufficient;
- (iii) Inadequate communication and interaction between the PIUs and other concerned stakeholders may lead to delays in procurement and poor cost projections;
- (iv) Administrative routines may result in procurement delays with the potential to affect project implementation;
- (v) Procurement concerning specialized business areas with few bidders can restrict competition and possibly increase prices and collusion risks;
- (vi) The poor filing of documents, which may lead to loss of documents; and
- (vii) Insufficient capacity overall, which can lead to poor contract management and administration of big contract.

111. All these risks can cause mis-procurement, possible delays in evaluation of bids and technical proposals leading to implementation delays, poor quality of contract deliverables, and reputational risks to the World Bank and the Project.

112. While the overall procurement risk is currently high, it is expected that it will be lowered to **Moderate** through the following mitigation measures:

- (i) Competitive hiring by SONATREL of a PS who is experienced and familiar with World Bank's procurement procedures and policies, to be part of the PIU;
- (ii) Competitive hiring by SNE of a PS experienced and familiar with World Bank's procurement procedures and policies, to be part of the PIU within SNE;
- (iii) Assignment of staff from SONATREL and SNE to be trained and coached by the PIUs' PSs, in order to be empowered onto procurement office responsibilities, and promote knowledge transfer;
- (iv) Training of procurement staff involved with the NPF;
- (v) Organizing training on procurement red flags in collaboration with INT (Preventive) for implementing agencies;
- (vi) Onboarding of OE with procurement and contracts management experts from early stage of project implementation;
- (vii) Market engagement/ sounding/ outreach for the large contracts to better understand evolving market and solutions offered;
- (viii) Detailing procurement procedures in the PIM, to clarify the roles of each member of the PIU, utility or government entities involved in the procurement process and defining the maximum delay for each procurement stage, specifically regarding review and approval systems, and the signing of contracts;
- (ix) Keeping the large value Works and OE contracts on team's radar for regular follow-ups with support from technical and safeguard team members, as may be needed;



- (x) Transfer the major risks (identified in the PRAMS exercise) to a day-to-day monitoring matrix and monitor it through project implementation monthly meetings with the Client during the first two years of the Project, to make sure things are on track; and
- (xi) Improving the filing system at the newly established PIUs to ensure compliance with the World Bank's procurement filing manual.

113. **Project Procurement Strategies for Development (PPSDs)** and draft Procurement Plans detailing the first 18 months of implementation have been reviewed and approved prior to negotiations. Cameroon is not new to the construction of HV transmission lines and there is an array of potential, tested contractors. Price contingencies and the unallocated amount reflect the uncertainties associated with Chad's lack of experience with this type of investments. During implementation, the Procurement Plans will be updated as required and at least annually, to reflect actual program implementation needs and improvements in institutional capacity.

C. Safeguards

(i) Environmental Safeguards

114. The proposed Project triggers World Bank's Operation Policy on Environmental Assessment (OP 4.01). The long HV transmission lines to be constructed under the Project will traverse savannah, wetlands, grasslands, forest and farmlands, and, in light of the potential adverse environmental and social impacts, including significant, permanent and irreversible effects, the Project has been designated as Category A. Adverse impacts may include: loss of vegetation and vulnerable species on the International Union for Conservation of Nature (IUCN) Red list; modification and fragmentation of wildlife habitats, and degradation of ecosystem services including spread of invasive species; bird and bat collisions with conductors; health and safety risks for workers and neighboring populations; loss of assets and income by project affected persons. Specifically, the risk classification has been based on the following factors: (i) total length of transmission lines, nearing 1,600 km across the two countries; (ii) the amount of land to be acquired for wayleave; (iii) the falling of trees along the right-of-way (RoW) of the lines – the cross-border line alone is expected to require a total of 4,733 hectares in Cameroon and 1,455 hectares in Chad; the RIS-RIN in Cameroon will likely require a total of 2,659 hectares; (iv) the corridor traversing sensitive natural areas, including passing through two community forests and near the boundaries of one forest reserve, as well as through a wildlife migration corridor³⁴; (v) the transmission line's proximity to protected areas and other important habitats such as the Benue and Mbam et Djerem national Parks in Cameroon and the Mandélie National Park and Toupouri lowlands (RAMSAR site) in Chad; (vi) the number of PAPs, currently estimated at 990 in Chad and 1,311 in Cameroon³⁵, as well as buildings, dwellings, trees, community properties (wells and boreholes) and graves; and (vii) permanent restrictions to land use and/or along the transmission lines and associated substations. The construction and extension of HV/MV substations will require land acquisition and/or easements for the RoW. Also, the construction of the cross-border line alone will require 1,500-2,000 workers, partly to be accommodated in workers' accommodation camps and interacting with local communities. This is a source of potential risks, which further confirms the appropriateness of the Category A classification. On the other hand, the Project is expected to generate large environmental benefits as deriving from the substitution of polluting diesel-based power generation with hydropower or the more efficient management of power networks enabled under Project.

115. **Environmental management instruments.** A number of safeguards instruments have been prepared or will be prepared for the Project as follows:

- (i) **ESIAs, ESMPs and RAPs were prepared by Cameroon and Chad in 2017 for the AfDB-financed cross-border line by**

³⁴ This will have to be confirmed once the updating of the ESIA prepared for the cross-border line is completed.

³⁵ Idem



an independent third-party consultant. These reports were validated at the national level and compliance certificates issued for Chad on August 30, 2017 and for Cameroon on December 1, 2017. The World Bank found these instruments to be compliant with World Bank's policies and to adequately address the potential environmental and social impacts associated with the line. Despite the good quality and while the corridor of the line remains the same, given the time elapsed since their preparation, it became apparent that an update would be needed to capture any changes that may have occurred along the corridor and in the circumstances of the PAPs. ToRs were prepared and approved by the World Bank to carry out the update and two international independent consultants were hired by SONATREL and SNE for carrying out this task, currently ongoing, for Chad and Cameroon respectively. While instruments related to the two countries are being kept as separate documents, one consolidated Executive Summary covering both will be prepared as SONATREL and SNE will hire a COE to supervise the construction of the cross-border interconnection. SONATREL and SNE will have to finalize the updated ESIA, ESMPs and RAPs and disclose them in both countries and internationally. The disclosure of the updated instruments (ESIA/ESMPs and RAPs), as cleared by the World Bank, is a disbursement condition for the IDA financing to Component 2 of the Project.

- (ii) ***For the purpose of preparing the RIS-RIN Interconnection, SONATREL carried out a preliminary ESIA (PESIA) including a corridor assessment/scoping study and a Resettlement Policy Framework (RPF).*** The PESIA constitutes a “framework-plus document”, as it goes beyond the scope of a typical environmental and social framework and already includes the analysis of alternative corridors. Specifically, it has focused on two routes proposed by the network study as main alternatives³⁶: (i) Nachtigal-Bafoussam-Foumban-Banyo-Tibati-Ngaoundéré; and (ii) Nachtigal-Yoko-Tibati-Hourou Oussoua/Ngaoundere. The PESIA assessed the socio-economic, environmental and cultural heritage characterization and appraised the two alternative routes through a combination of desk studies and field survey³⁷. The Nachtigal-Bafoussam-Foumban-Banyo-Tibati-Ngaoundéré route was found to potentially have larger socioeconomic impacts, as it would cross the territory of fourteen municipalities that are home to approximately 330,545 people living in settlements affected by the corridor and two-hundreds settlements and one primary school right within the corridor, and with a higher density (70-80 inhabitants/km²). The corridor would also pass through a protected area. Nachtigal-Yoko-Tibati-Hourou Oussoua/Ngaoundere was found less impactful. It would cross the territory of five municipalities with approximately 137,574 residents and eighteen settlements within the corridor³⁸. The population density is also much lower (11,72 inhabitants/km²). There would be potential environmental impacts as defined in paragraph 113. The assessment has not included techno-economic aspects and substation sites. It is estimated that the substation premises will need an area of approximately 5.175 hectares, including the safety buffer; the facility installations alone will cover a footprint of about 20,700 hectares. Based on the preliminary analysis of alternative corridors, SONATREL has selected the Nachtigal-Yoko-Tibati-Hourou Oussoua/Ngaoundere one for further planning. The PESIA was reviewed and approved by the World Bank and publicly disclosed on April 20, 2020 in Cameroon and on the World Bank's external website on April 21, 2020. Once the detailed design of the RIS-RIN Interconnection is completed, the PESIA will feed into a full ESIA/ESMP, to be prepared together with a RAP by an independent third-party consultant, different from the one who prepared the PESIA. The RPF defines the principles for identifying, measuring and compensating impacts on people and livelihoods. In line with OP 4.01 and OP 4.12, a framework document has been selected because exact locations of investments are not known, and potential impacts cannot be determined until the project details have been identified. The RPF was approved by the World Bank publicly disclosed in country and internationally on May 6, 2020. SONATEL will not carry out any works under Component 1 of the Project until site-specific ESIA, ESMP and RAP are publicly consulted upon, finalized, adopted and publicly disclosed in form and in substance satisfactory to the World Bank.

³⁶ The full ESIA consulting firm will still undertake a comprehensive alternatives assessment.

³⁷ The full ESIA firm will be required to undertake further primary data collection.

³⁸ To be confirmed once the RAP is completed.

(iii) For the new investments in electrification in N’Djamena under Component 3, since the specific site locations are not yet known, it was agreed that **SNE would produce an Environmental and Social Management Framework (ESMF) and a RPF**. These documents were reviewed and approved by the World Bank as they were deemed to be compliant with the applicable World Bank safeguard policies. The ESMF and the RPF were broadly consulted in N’Djamena on April 4, 2020 and, thereafter, finalized on the basis of public consultations, adopted by SNE and disclosed in country and internationally on April 17, 2020. SNE will not carry out any work on electrification under Component 3 until site-specific ESIA, ESMP and RAP are publicly disclosed in form and in substance satisfactory to the World Bank.

116. Table 3 provides an overview of the safeguard instruments prepared and/or to be prepared and timing for disclosure.

Table 3: Status of new safeguards instruments

Country	Component/Part	Instruments	Status, consultations with stakeholders and public disclosure dates
Cameroon	Component 1	PESIA	Finalized, consulted upon and disclosed in-country on April 20, 2020 and on World Bank external website on April 21, 2020.
		RPF	Finalized, consulted upon and disclosed in-country and on World Bank external website on May 6, 2020.
		Full ESIA/ESMP	ToR approved by the World Bank. The final report will be consulted upon, cleared and disclosed. The COVID-19 pandemic may affect the process as social distancing measures in place are limiting face-to-face awareness sessions and multi-stakeholder consultations. information communication and technology (ICT) solutions will be sought to support project preparation.
	Component 2	Updated ESIA/ESMP	Ongoing ³⁹ . To be disclosed prior to disbursement of the IDA grant to Chad.
		Updated RAP	Ongoing ⁴⁰ . To be disclosed prior to disbursement of the IDA grant to Chad.
Chad	Component 2	Updated ESIA/ESMP	Ongoing. To be disclosed prior to disbursement.
		Updated RAP	Ongoing. To be disclosed prior to disbursement.
	Component 3	ESMF	Finalized, consulted upon and disclosed in-country and on World Bank external website on April 17, 2020.
		RPF	Finalized, consulted upon and disclosed in-country and on World Bank external website on April 17, 2020.

117. **ESMP.** Environmental and social mitigation measures linked to construction activities will be incorporated in the bidding documents for the EPC contractors, who will be required to submit a draft site specific- contractor’s ESMP (C-ESMP) as part of the tendering requirements. The EPC contractor and subcontractors are contractually required to develop an emergency preparedness and response plan as well as a chance find procedure as part of their ESMP. In addition, they will have to produce a site specific Occupational, Health and Safety (OHS) Plan and related procedures that prescribe how to identify and minimize hazards to workers; provide appropriate equipment; identify preventive and protective

³⁹ The disclosure of ESIA/ESMP/RAP for the cross-border line is a disbursement condition for Chad only as IDA does not provide finance to the line on the Cameroon’s side.

⁴⁰ Same as above.



measures; train workers; and document and report accidents, diseases, incidents, and near misses.

118. **Environmental Safeguards policies.** The World Bank's safeguards policies triggered for the Project and underpinning its safeguards instruments are: OP/BP 4.01 (Environmental Assessment); OP/BP 4.04 (Natural Habitats); OP/BP 4.11 (Physical Cultural Resources) and OP/BP 4.36 (Forests). The ESIA and applicable World Bank safeguards policies will apply equally to portions of the Project being financed by AfDB. The Project is subjected to the WBG General Environmental, Health and Safety (EHS) Guidelines and, during construction of the transmission lines and substations, the EHS Guidelines for Electric Power Transmission and Distribution will apply and will be/have been incorporated in the Safeguard Instruments for the Project.

119. **Environmental Assessment OP/BP 4.01.** As highlighted above, safeguards instruments prepared in compliance with OP/BP 4.01 include: (i) PESIA for the RIS-RIN Interconnection, including a corridor assessment and scoping study; (ii) an RPF for the RIS-RIN Interconnection; and (iii) an ESMF and RPF⁴¹ for activities in Chad. The PESIA raised some potentially major concerns regarding biodiversity, settlements, burial sites, electromagnetics, community forests, etc., which will be addressed by full ESIA/ESMP for the RIS-RIN Interconnection. Public hearings will be organized by the Ministry of Environment, Nature Protection and Sustainable Development (MINEPDED) of Cameroon for consultation on the draft full ESIA/ESMP. ToRs for the full ESIA/ESMP were included in the PESIA and cleared by the World Bank. Technical studies are underway and the coordination with the ESIA/ESMP process is embedded in the ToRs of the consulting companies recruited to prepare technical studies and ESIA/ESMP respectively. The two firms are bound to exchange data and information and ensure that environmental and social considerations inform the design process. The final ESIA/ESMP report, to be grounded on technical designs, will identify and assess environmental, social, and health impacts and critical risks so that:

- (i) modifications can be made to the Project to reduce environmental, social and health risks and impacts;
- (ii) the conditions under which the Project can proceed are clarified; and
- (iii) management strategies can be identified/implemented to reduce the significance of any environmental, social, and health impacts.

The final ESIA/ESMP report will cover *inter alia*: alternatives; cumulative impact assessment; quantified socioeconomic impacts; refined ESMP-Budget; and public hearing findings. Mitigation measures will be proposed for each identified impact and will be synthesized in the ESMP. Furthermore, the existing ESIA/ESMP⁴² for the AfDB-financed Cameroon-Chad Interconnection (Component 2 of the Project) will be updated in line with the requirements of OP/BP 4.01.

120. SONATREL and SNE will set up their environmental and social team to support the preparation, implementation, and monitoring of the ESMPs. Qualified environmental and social specialists will be on the ground, and their capacity will be strengthened throughout the lifecycle of the Project. Environmental and social mitigation measures linked to construction activities will be incorporated in the bidding documents and contractual arrangements. The bidding documents will clearly state that no construction works will begin prior to the clearance of ESMPs and RAPs submitted by contractors. During construction and operation of infrastructure, mitigation measures at the construction sites will include standard construction pollution prevention and control measures, such as: (i) solid and hazardous waste handling and disposal; (ii) domestic/camp wastewater treatment; (iii) storage and handling of hazardous materials; (iv) housekeeping; (v) control of erosion and storm water runoff; and (vi) noise, vibrations, and dust abatement measures, among others.

⁴¹ For which 15 consultations with selected stakeholders have been carried out in Feb. 2020 and a – largely virtual - National Committee for ESMF/RPF validation (“*Atelier national de validation*”) was organized in Ndjamena on April 4, 2020 by the Chadian ministry of Environment with SNE support, in compliance with OPCS guidance on *Public Consultations and Stakeholder Engagement in World Bank-supported operations when there are constraints on conducting public meetings* dated March 20, 2020.

⁴² For which public consultations in 39 villages (28 in Cameroon and 11 in Chad) have been carried out in December 2016.



These mitigation measures will have to be included by the EPC contractors and subcontractors for civil works in their ESMPs (i.e. waste management plans, hazardous materials management plans, and effluents management plans).

121. **Natural Habitats OP/BP 4.04.** The proposed alignment of transmission lines does not pass through any protected areas. However, this policy has been triggered because of their proximity to protected areas and other important habitats such as the Benue National Park, the Mbam-Djerem National Park in Cameroon and the Mandélie National Park and Toupouri lowlands (RAMSAR site). In addition, the line from Nachtigal to Ngaoundere runs along or near the boundaries of one forest reserve. In addition, three cynegetic zones (ZIC 41:Likini-75000 ha; ZIC 42-Lukom:70850 ha and Doumé Yoko: 24 245 ha) were found in the Project's area of influence in Cameroon. Potential indirect impacts on natural habitats include hunting by workers and improved access to poachers. Cumulative impacts on the protected areas in Cameroon will be assessed in parallel with the final design of the RIS-RIN Interconnection. Mitigation measures are required in the ESMPs for those impacts and for potential loss of biodiversity caused by bird collisions and disturbance of wildlife movement. SONATREL has committed to engage specialists for preparation of a wildlife corridor management plan and/or a biodiversity management plan, and additional studies of birds and bats along the corridor and protected areas along the transmission line, all to be completed and reviewed by the World Bank prior to construction. A biodiversity specialist will be recruited in the SONATREL PIU within three months of project effectiveness.

122. **Forests OP/BP 4.36.** The Project does not support commercial exploitation of forests. However, this policy has been triggered because the RIS-RIN Interconnection line is likely to pass through two community forests. In addition, the ESIA/ESMP prepared for the AfDB-financed cross-border line identified the felling of trees along the transmission line ROW covering a total of 4,733 hectares in Cameroon and 1,455 hectares in Chad. Mitigation measures, considering mitigation hierarchy and limiting the offset, are being assessed and will be identified as part of the finalized full ESIA/ESMP. Direct impact on natural habitats (mostly bush, scrub, shrubland and grassland) can be mitigated through selective clearing.

123. **Physical Cultural Resources OP/BP 4.11.** Previous studies conducted in the region have revealed the existence of heritage sites with local significance (such as graveyards) and the ESIA/ESMP prepared for the AfDB-financed cross-border line has identified potential impacts on graves. Mitigation measures will be incorporated into the PESIA and ESIA/ESMP reports. Contractors will be required to develop a chance find procedure as part of their ESMPs, at least 30 days in advance before commencement of works.

124. Based on the PESIA, the residual environmental and social impacts after mitigation are acceptable.

(ii) Social Safeguards

125. Activities financed by the Project will require some land acquisition and will likely generate negative impacts on communities and assets along the transmission lines in Cameroon and Chad and therefore operational Policy 4.12 (OP 4.12) on Involuntary Resettlement has been triggered. As the exact routes of the transmission lines are not yet well known, two RPFs were prepared and disclosed for Cameroon and for Chad (see paragraph 115) to set land acquisition guidelines principles to be applied when conducting specific RAPs. A RAP will be prepared for the RIS-RIN Interconnection once exact locations are known and it will identify people and assets affected by the Project, propose compensation mechanisms and recommend additional measures in case of physical displacements, all in accordance with the provisions of OP 4.12. The RAP prepared for the AfDB-financed cross-border interconnection in 2017 in Cameroon will be updated together with the ESIA/ESMP. The RAP prepared in 2017 in Chad (covering Bongor and Guelendeng itinerary and N'djamena) is also being updated. Given the time elapsed since the project was approved by AfDB and the security issues in the region in general, there is a high probability that the situation of land occupation along the line corridor has changed. The update will focus on: (i) verifying whether there have been new occupations/owners along the corridor and adjust the RAPs accordingly; (ii)



confirming that the methodologies for identifying PAPs and assets affected by the Project as well as the asset evaluation are consistent with OP 4.12; and (iii) identifying additional risk mitigations measures/compensation as needed or to address insecurity in the region. Because of the lengthy timeline involved, especially to resurvey the corridor along its length and the limitations later occurred due to the COVID-19 pandemic, it was agreed that safeguards instruments for the cross-border line, including RAPs, could be completed and disclosed after appraisal but prior to disbursement for Component 2 of the Project. Construction or expansion of substations in ten localities could also generate land acquisition and loss of assets or economic displacement. These potential impacts will be considered within the framework of the RAPs planned above or in specific RAPs depending on their location. The construction of additional rural electrification distribution networks along the transmission line corridors in Cameroon and Chad may also generate impacts on PAPs and goods and may necessitate land taking. Based on specific ESIA's and RPFs' recommendations, additional RAPs could also be elaborated. OP 4.10 on Indigenous People has not been triggered as the PESIA conducted in Cameroon confirmed that there are no indigenous communities located along the corridor of the RIS-RIN Interconnection, including the Nachtigal - Tibati area. There are no indigenous peoples in the area in which the transmission line will be constructed in Chad.

126. **Gender Based Violence and social risks.** Social risks of this project are High due to the scope of operations on field covering three regions in Cameroon and Chad; all of which are remote and subject to a medium to high level of insecurity. Projects activities will necessitate the recruitment of a labor force at the national and local level. It is anticipated that around 3,000 workers will be mobilized in Cameroon and in Chad. This could lead to risks related to: (ii) Gender Based Violence/Sexual Harassment and Abuse (GBV/SEA); (ii) safety of workers in an unsecure environment due to Boko Haram attacks; and (iii) construction works and working conditions. A GBV risk assessment will be completed as part of preparation of full ESIA's to identify appropriate prevention and management during project implementation and a GBV mitigation plan will be elaborated and implemented. Specifically, lessons learned related to labor influx and associated GBV issues in large infrastructure projects will be duly incorporated in the project design such as: (i) a contractual requirement to implement a code of conduct and action plan – including training – for prevention of GBV by EPC Contractors management and workers; (ii) the inclusion in the code of conduct and disciplinary procedures of an explicit prohibition to engage in sex with minors and sexual harassment; (iii) the specification, as part of the Grievance Mechanisms for the Project to acquire the expertise to handle GBV related complaints and ensure the GRM provides a means for victims to speak in full confidence through the engagement of a non-governmental organization (NGO); and (iv) the provision of services to survivors. In addition, the implementing agencies will undertake an analysis of security risks before conducting field operations and a mitigation plan will be proposed and implemented prior to the start of works. This will outline the key measures to be put in place by authorities, implementing agencies and contractors involved in field activities. Provisions and measures concerning GBV, child labor, wages and implementation of social and environmental safeguards policies will be integrated into bidding documents to ensure that work conditions are aligned with the World Bank's operational policies and good practice.

127. **Grievance Mechanism.** A GRM in each country will be established and implemented to ensure that a consistent community engagement program is undertaken to explain Project's activities to all stakeholders and to properly manage all project-related complaints. A specific GRM will be put in place by contractors for all contracted workers to ensure that complaints related to occupational, health and safety and work conditions, as set out in the Project safeguard instruments, are also addressed.

128. **Gender.** Providing households with access to electricity and improved energy services has the potential to promote gender equality, create employment and business opportunities for women, and improve development outcomes. For example, women have better access to education; also, their health can be significantly improved by reducing reliance on polluting and inefficient solid fuels, easing the burden of doing household chores manually. Evidence



shows however, that these benefits are often realized only if approaches specifically target both men's and women's needs and realities, and are integrated in the design and implementation of project interventions.

129. *Entry Points and Actions.* The Project can be leveraged to narrow identified gender gaps in Chad and more precisely in N'Djamena by reducing disparity of access to electricity of poorer urban households and in particular female-headed households. The dedicated sub-component will focus on closing gender gaps between households headed by women and men, of which a detailed analysis is available in Annex 5. Data shows that there is a gender gap across the board in N'Djamena (access of 51.0 percent for male-headed households versus 43.8 percent for female-headed households) and even in the highest quintiles (40.1 percent versus 29.8 percent for female-headed households). Therefore, potential barriers to connection including financial or administration- and information-related will be assessed to help design interventions that accelerate connection of targeted consumers (for example, partial or full subsidy of connection charges or credit schemes to allow affordable installments).

130. *Indicator.* A dedicated intermediate indicator will measure the percentage of female-headed households provided with improved electricity services⁴³. The indicator will track the closure of the gender gap by measuring percentage of female-headed households that gain electricity access. Given the gap identified, equity would be achieved if female-headed households are connected at the same rate as male-headed households. Therefore, a target has been set of reaching 19.3 percent of female-headed households under the Project, which is the overall percentage of female-headed households present in N'Djamena. The baseline is listed as zero as the gap has been identified above, but the baseline for the sites in N'Djamena is unknown. Focus will be placed on cross-validating the post-electrification findings through possible surveys and focus-group discussions to track project impacts at the community level.

131. **Institutional Arrangement for Safeguards Management.** SONATREL and SNE will be implementing the Project within their respective countries' borders, and as a result, they will be responsible for compliance with the related environmental and social safeguards. Neither agency has an established environmental and social team so each of them will recruit a social and an environmental specialist who will join their respective PIUs and coordinate with OEs and other consultants hired to provide project implementation prior to the start of civil works. The two companies will also need capacity building to strengthen their management and monitoring of occupational safety risks, environmental and social risks and impacts related to the construction and operation of transmission lines and substations. This capacity building will be ongoing and monitored by the World Bank.

132. EPC contractors entrusted with works and their sub-contractors will be subject to OHS contractual provisions and industry standards, which will match the scope of works and address aspects such as: construction site maintenance; worker accommodation; management of access roads including security and access, as well as fuel storage area, workshop, warehouse; ongoing training for all workers; sanctions and penalties to address environmental and social non-conformities and late payment of wages; adequate meals; site safety plans; internal and external GRMs; documented internal work regulations including conditions for overtime pay; medical evacuation; reporting (monthly, quarterly including accident statistics, workers grievances and social security contributions, etc.); preparation and approval of site-specific EMSPs; etc. The OEs to be contracted by SONATREL and SNE will ensure that execution of works by EPC contractors comply with established EHS contractual requirements and the OEs' may be required to hire EHS and social development specialists to monitor contractors' EHS performance. Cameroon has an existing institutional structure overseeing environmental and social safeguards, notably including MINEPDED and other sector ministries (Ministry of Domain, Cadastral and Land Registration Affairs; Ministry of Public Health; MINEE, etc.), which are responsible for approving ESIA. The country also has a comprehensive environmental legal framework, including the 1996 Environmental Law and its

⁴³ Baseline: 0 Target: 19.3 percent. See Results Framework.



implementation decrees. Any project for which an environmental assessment is carried out is subject to the administrative and technical supervision of the relevant authorities, which focuses especially on the effective implementation of the ESMP included in the ESIA. The Order No. 0010/MINEP of April 3, 2013, requires that Committees are set up in each concerned Division of the country for the technical and administrative supervision of ESMPs. Also, the compensation to PAPs must be completed prior to making the project effective. However, these Committees are mostly not operational as they lack adequate financing and they are not fully integrated into the Ministry's planning process. The Project will bear the costs associated with the operation of the different Divisional Committees in charge of monitoring ESMPs in the project areas, which will be better known once full ESIA/RAPs have been prepared and arrangements are made concerning the functioning of such Committees.

(iv) Grievance Redress Mechanisms

133. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit <http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service>. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

V. KEY RISKS

134. The overall risk rating of the proposed Project is rated as **High**. The Project's main risks and related mitigation measures are as follows.

135. **Political and governance: High.** Discussions between Cameroon and Chad concerning the cross-border interconnection, have spanned two decades. Yet, changing political interests in both countries; fragility issues in Chad; power sector reforms in Cameroon that have taken the center stage of Government's attention; as well as the persistent security crisis in the Far North of the Cameroon have prevented the two Governments from agreeing on a clear and time-bound roadmap to implement the cross-border interconnection. All of these factors may lead to lengthy negotiations of the commercial contracts, an unfair allocation of benefits and risks among the parties involved, and eventually impair the stability of the PPA overtime. Additionally, the Project could be affected by the still fragile situation in Chad, where the decision-making process is highly centralized with frequent turnover at Minister/ Director levels. The commitment to trade power and the negotiation of contractual arrangements also risk being affected by the emergencies caused by COVID-19 and the shifting government priorities in the aftermath of the pandemic. **Mitigation:** Both countries attach strong political significance to the Project, which is seen as a means to promote integration, as well as stability and security along the border. This will be even more important in the aftermath of COVID-19. The approval of financing for the cross-border interconnection by the AfDB has marked a renewed momentum, which has become stronger since the World Bank joined forces with the AfDB. The World Bank has taken the lead in convening the two countries; it has facilitated dialogue on implementation and commercial arrangements and will remain engaged with them as they enter contract negotiations. Furthermore, transaction advisory services to the parties involved will be included into the Project.



136. **Macroeconomic risks: High.** Cameroon's power sector is subject to a significant amount of volatility stemming from external factors such as interest rates, financial markets and the interests of key foreign trade and investment partners. Macroeconomic conditions will deteriorate in the aftermath of COVID19, with growth slowing down and fiscal deficit increasing (see Boxes 1 and 2). The energy sector in Chad is subject to significant volatility given its dependency on oil. Moreover, future investment in the sector's infrastructure will be contingent on the sustainability of Cameroon and Chad's rapidly rising debt burden and fiscal discipline. **Mitigation:** Despite the economic downturn, growth in Cameroon is expected to recover as early as 2021. No emergency funding is expected to be allocated to Cameroon, which attests a relative higher resilience compared to other economies. Furthermore, reforms needed for creating fiscal space remain enshrined in the DPF series, with the third tranche soon to come. Structural reforms are needed to improve the business environment, diversify the economy, and build resilience to external shocks. While none of the macro risks can be addressed directly, the Project itself will contribute to greater resiliency to many of these risks by helping both countries secure expanded and more cost-efficient electricity supply and improve the overall financial situation of their power sectors.

137. **Sector strategies and policies risks: High.** The governance structure of Cameroon's power sector is in flux as key contracts among power companies remain to be signed and assets to be transferred from one entity to another – such as the transmission access contract and the transfer of assets from ENEO and SONATREL – following the unbundling reform. The GoC has demonstrated shifting sentiment vis-à-vis private sector participation in the electricity sector and sector governance, ownership and/or operation of major power infrastructure may be changed without much consideration of efficiency, transparency and competition principles. The large arrears within the sector also endanger the sector's financial viability. More importantly, delays in the commissioning of major generation projects may reduce the amount of electricity supply available for exports to Chad. All these factors together cause a climate of uncertainty and volatility, which raises questions on the commitment and credibility of Cameroon as exporter of electricity. In Chad, the World Bank is re-engaging in the energy sector, in a context of low access rates, ageing infrastructure, and a poorly performing national utility. The recent fiscal crisis has put pressure on decision-making processes, and priorities may change rapidly or not be translated into tangible actions, despite strong commitment. In addition, SNE has no consistent payment track record for electricity supply, nor import, and its poor commercial performance affects negatively the cash position of the utility. The non-creditworthiness of SNE represents a significant risk for Cameroon exporter, that may affect SNE ability to honor contractual obligations under PPA/TSA. **Mitigation:** The World Bank is Cameroon's lead partner and financier in the power sector, and World Bank's assistance has been instrumental to make SONATREL operational. Support to key reforms steps, such as the clearance of arrears and performance indicators agreed for ENEO, is built under the DPF. The appointment by the GoC of the signatories of the PPA and the TSA will be a disbursement condition. The World Bank will remain closely engaged with Cameroon's Government and the entities involved in power trade with SNE and facilitate power trade negotiations. The regional scope of the Project has enabled Cameroon to access cheaper and larger financing from the regional IDA window for the RIS-RIN Interconnection, which is a key piece of domestic infrastructure. This fortunate opportunity has reinforced the country's commitment to the Project. As part of the World Bank's reengagement in Chad energy sector, the World Bank is preparing an energy DPF series that will support efforts to reduce the cost of electricity supply, improve the financial sustainability of the energy sector and increase access to modern electricity services in a sustainable manner, thereby concurring to mitigate sector policies risks. SNE's off-taker risk would be mitigated by (i) the provision, through the Project, of transaction advisory services to Cameroon and Chad for the preparation of robust contractual arrangements, including provision of measures for securitization of payments (capitalizing on WAPP experiences and recent directive on trade securitization); (ii) overall sector reform program in Chad, supported through the World Bank reengagement in the sector (including upcoming energy DPF series) aimed at securing a financially stable trajectory to extend access; and (iii) highest level political commitments in both countries for this strategic flagship Project.



138. **Technical Design of Project or Program: Substantial.** The design of national or regional power network infrastructure is not technically complex, and in the case of the proposed Project, most part of it has been already fully designed. The network study completed for the cross-border interconnection includes bidding documents and a similar study for the RIS-RIN interconnection is nearly complete. Nonetheless, the instability in the areas close to the border between Cameroon and Chad may result in risk of attacks and vandalism to the line, construction workers and equipment. **Mitigation:** Please refer to *security* risk below.

139. **Institutional Capacity for Implementation and Sustainability: High.** The Project's sustainability is conditional upon signature of robust contracts for power trade, but both countries have little understanding of the process involved and how to manage risks. A clear roadmap for negotiation of commercial aspects leading to a PPA is missing. SONATREL's project implementation capacity is challenged by the large investment program facing the company, at a time when its finances are challenged by the large arrears accumulated from ENEO. SNE dramatically lacks technical capacities and has no recent experience in implementing IDA-financed projects. The proposed Project will add a considerable workload to both SONATREL and SNE, and the construction of the cross-border line may be affected by the lack of effective coordination between the two, especially on procurement and supervision of works within the respective territories. Delays, technical and fiduciary issues on one side would de facto derail implementation on the other. **Mitigation:** Disbursement conditions and covenants concerning commercial contracts will bound countries to engage in negotiations and technical assistance under the Project will support the parties through the process. Also, the World Bank will remain closely engaged and facilitate dialogue among the parties and negotiations. As detailed in the implementation arrangements, a joint supervision structure will be established for the construction of the cross-border line, including the CdP, CT and, more importantly, the COE, which will ensure that works on both sides follow a compatible timeline and technical standards. The Project incorporates large implementation support tailored to the needs of SONATREL and SNE. SONATREL will establish a PIU specifically dedicated to the Project, based on a model that is now well tested. The preparation advance provided to SNE has allowed to recruit external expertise to help prepare the Project. Support will continue throughout implementation and endow the PIU established within SNE with the needed skills. Both SONATREL and SNE will recruit OEs to supervise works within their own borders.

140. **Fiduciary risks: High.** SNE currently lacks minimal fiduciary capacities to manage IDA resources. Concerning SONATREL, although the company has accumulated significant experience by implementing the ETRP, there is an history of delays in procurement. **Mitigation:** The Project will finance significant implementation support to SNE and SONATREL. SONATREL will establish a PIU, which promises to guarantee undivided attention and adequate human resources dedicated to implement the Project. In addition, the World Bank team will closely monitor procurement and FM aspects.

141. **Environmental and Social: High.** The overall environmental and social risks are considered High due to the length of the transmission lines to be financed by the Project, their proximity to four National Parks and two forest reserves in Cameroon, potential impacts on PAPs and their assets and lands along the transmission lines corridor and other risks related to labor influx including GBV and working conditions in rural areas. In addition, the transmission lines will be installed in an area of high insecurity due to Boko Haram activities especially in the Far North Cameroon. SONATREL's and SNE's limited environmental and social management capacity is likely to cause some delays and complicate the operation and maintenance of transmission lines and substations. **Mitigation:** SONATREL's and SNE's safeguards capacity will be strengthened with the recruitment of an environmental and a social specialist for their PIUs. Both entities will be mandated to set up a functional grievance redress mechanism. SONATREL will also hire a biodiversity specialist. In addition, training will be provided to the divisional committees that will also be responsible for monitoring the implementation of the ESMPs in the project areas. The ESIA that will be prepared by SONATREL for the RIS-RIN interconnection will include a wildlife corridor management plan and/or a biodiversity management plan, an additional



study on fauna (birds and bats in particular) that live in the corridor and protected areas along the transmission line will be completed and reviewed by the World Bank before construction and recommendations taken into account in the final alignment of the transmission line.

142. **Stakeholders: Substantial.** The risk stems from the multiplicity of stakeholders in Cameroon's power sector, which may have different, possibly contrasting, interests vis-à-vis the Project and the prospects to trade power with Chad. The commitment to accommodate electricity exports, as defined in the PPA, may generate tensions domestically shall any of the planned generation capacity additions not materialize on time, eventually posing a threat to energy security in the country. Similar concerns may arise in Chad, as the country becomes dependent on electricity imports from Cameroon to meet a significant part of its energy needs. Public and private interests in the development of large-size solar generation capacity domestically may also enter in conflict with the commitment to import electricity. **Mitigation:** Cameroon has confirmed commitment to accommodate exports, which will be accounted for in future generation expansion plans. Also, hydropower can be supplemented by thermal generation, until its capacity reaches a size in line with domestic and regional demand. This may require delaying the retirement of some thermal plants, and notably HFO. In Chad, plans for solar generation expansion remain theoretical at this stage, while the country recognizes that imports from Cameroon represent the most practical option to increase electricity supply in the short term and at the lowest cost. Above anything else, robust commercial contracts can minimize stakeholder risks, by ensuring that benefits and liabilities are fairly allocated, and the regime of penalties and other risk mitigation measures provide adequate confidence to all the parties involved. The World Bank will continue to closely engage with the two governments and provide advice and support throughout the negotiation process.

143. **Security: High.** The fragile situation in some of the Project area, notably in Northern Cameroon and along the border in Chad, and also due to terrorist threats from Boko Haram, could impact negatively the delivery of infrastructure, as well as affect the communities alongside the Project areas. **Mitigation:** A social assessment with a focus on security risks will be conducted in potential insecure areas to identify mitigation measures building on the lessons learned from other projects implemented in similar conditions. Specifically, mitigation measures may include, but not be limited to, the following: (i) regular coordination with dedicated government agencies and international humanitarian organizations will be carried out to assess level of risk and discuss whether any adjustments should be made to works (timing, sequence, etc.); (ii) key local and international NGOs and media will be identified and engaged to regularly brief and update them on the ongoing works and to gather information regarding their perceptions and work in the Project areas; (iii) an embedded NGO as facilitator/ manager of the GRM will be recruited; (iv) a broad outreach program to the local communities will be put in place to emphasize the benefits of the Project and the parallel rural electrification programs; (v) strategic relationships with humanitarian organizations and national programs will be developed to provide support to the communities; and (vi) the use of third-party monitoring arrangements will be evaluated. Furthermore, the obligation to ensure safety of workers in high-threat areas will be enforced on contractors through: (i) appropriate costing of the security arrangements to be carried out on the construction sites, to ensure the utmost safety of workers and equipment; (ii) adequate training for counterparts and contractors; and (iii) a contingency for security incorporated in project costs. While security risks are addressed directly by the Project, investments in electrification expansion will contribute to lowering such risks by helping reduce public discontent and fragility in rural areas, as well as by supporting income generation activities.



VI. RESULTS FRAMEWORK AND MONITORING

Results Framework

COUNTRY: Africa

Cameroon - Chad Power Interconnection Project

Project Development Objectives(s)

The Project Development Objective is to : (i) interconnect the Southern and Northern power systems of Cameroon; (ii) enable electricity trade between Cameroon and Chad; and (iii) increase access to electricity in the Chad capital city of N’Djamena.

Project Development Objective Indicators

Indicator Name	PBC	Baseline	End Target
Increase Cameroon’s transmission capacity from Southern to Northern Cameroon			
Electricity transmitted from RIS to RIN (Megawatt hour(MWh))		0.00	522,000.00
Enable electricity trade between Cameroon and Chad			
Electricity traded between Cameroon and Chad (Megawatt hour(MWh))		0.00	438,000.00
Increase electricity access in Chad with a focus on the N’Djamena power system			
People provided with new or improved electricity service (CRI, Number)		0.00	540,000.00



Intermediate Results Indicators by Components

Indicator Name	PBC	Baseline	Intermediate Targets	End Target
			1	
RIS-RIN interconnection				
RIS-RIN HV transmission line (Kilometers)		0.00	53.00	532.00
RIS-RIN substations (Number)		0.00		4.00
Cameroon-Chad interconnection				
Cameroon-Chad Interconnector HV transmission line (Kilometers)		0.00	102.00	1,024.00
HV substations in Chad (Number)		0.00		3.00
Electricity access in Chad				
Meters installed in N'Djamena (Number)		0.00	50,000.00	100,000.00
Total losses in N'Djamena (Percentage)		36.00	28.00	15.00
Female-headed households provided with new electricity services (Percentage)		0.00		19.30
Share of registered grievances that are addressed (Percentage)		0.00		100.00

Monitoring & Evaluation Plan: PDO Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Electricity transmitted from RIS to RIN	This indicator measures the electricity flow (in MWh) through the 225kV double	Annual	SONATREL	SONATREL PIU reports	SONATREL PIU



	circuit transmission line from Nachtigal (RIS) to Hourou Oussoua-Ngaoundere (RIN) financed under the project.				
Electricity traded between Cameroon and Chad	This indicator measures the electricity trade (in MWh) through the 225kV cross-border interconnector between Cameroon and Chad financed under the project.	Annual	SONATREL and SNE	PIU reporting	Joint SONATREL-SNE technical committee
People provided with new or improved electricity service		Annual	SNE PIU reporting	Number of meters installed by the projects (100,000 units) x average size of households in Chad (5.4)	SNE

Monitoring & Evaluation Plan: Intermediate Results Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
RIS-RIN HV transmission line	This indicator measures the length of the 225kV double circuit transmission line from Nachtigal (RIS) to Hourou Oussoua-Ngaoundere (RIN) financed under the project.	Annual	SONATREL	SONATREL PIU reports	SONATREL PIU



RIS-RIN substations	This indicator measures the number of substations for the RIS-RIN interconnector financed under the project.	Annual	SONATREL	SONATREL PIU reporting	SONATREL PIU
Cameroon-Chad Interconnector HV transmission line	This indicator measures the length of the 225kV cross-border interconnector financed under the project.	Annual	SONATREL and SNE	PIUs reporting	Joint SONATREL-SNE technical committee
HV substations in Chad	This indicator measures the number of substations in Chad for the cross-border interconnector financed under the project.	Annual	SNE	SNE reporting	SNE PIU
Meters installed in N'Djamena	This indicator measures the number of meters installed by SNE in N'Djamena, financed by the project, for both (i) existing customers with malfunctioning or without meters, (ii) new customers.	Annual	SNE reports	SNE PIU reporting	SNE PIU
Total losses in N'Djamena	This indicators measures total losses (both technical and non-technical) on N'Djamena networks, measured as total billed electricity (in kWh) divided by total electricity injected in the system (in kWh)	Annual	SNE reporting	SNE Annual Reports	SNE
Female-headed households provided with new electricity services	The indicator will track the closure of the gender gap on electricity access by				



	measuring percentage of female-headed households that gain access. Equity would be achieved if female-headed households are connected at the same rate as male-headed households. Therefore, under the Project a target has been set of reaching 19.3% of female-headed households, which is the overall percentage of female-headed households present in N'Djamena. Focus will be placed on cross-validating the post-electrification findings through possible surveys and focus-group discussions to track project impacts at the community level				
Share of registered grievances that are addressed	Percentage of grievances registered by PAP that have been addressed				



ANNEX 1: Implementation Arrangements and Support Plan

COUNTRY: Africa

Cameroon - Chad Power Interconnection Project

A. Institutional and organization arrangements

1. The Governments of Cameroon and Chad first came together in 2007 with the common objective to develop the Cameroon-Chad Interconnection for enabling power trade between the two countries and the electrification of the rural areas near the border. A Protocol Agreement was signed by the respective Energy Ministers on February 10, 2009 and envisaged the establishment of an Inter CdP, a joint committee chaired in turn by the two Ministers and comprising of representatives of other relevant ministries, power companies and regulators of Cameroon and Chad. The CdP was intended to provide a consultative forum to take strategic decisions and ensure overall oversight of the Project at the supranational level. The two Governments also agreed to maintain separate implementation of the Project; that is, implementation would not be delegated to a centralized structure, but be entrusted to the respective national transmission entities, notably SONATREL for Cameroon and SNE for Chad, which would also own the cross-border Interconnection within their respective country borders and be responsible for its operation.

2. These provisions have been reflected in the implementation arrangements identified for the AfDB-financed project and confirmed during preparation of the proposed Project. SONATREL and SNE will be the implementing agencies for the Project's activities within their respective countries. Specifically, SONATREL will be responsible for the construction and operation of the RIS-RIN Interconnection and the sections of the cross-border transmission line within Cameroon's borders. As a publicly owned transmission company operating in a monopoly regime and with TSO functions, SONATREL is entitled to own and operate all transmission assets in the country and is remunerated through a wheeling tariff paid by generators in the power market. Similarly, SNE will construct and operate the cross-border transmission line within Chad's borders and the infrastructure needed to electrification expansion under the Project. As sole vertically integrated utility in Chad, SNE is bound to implement all investments in the energy sector across the value chain, although the entrance of new generators is envisaged by law.

3. Nonetheless, the two countries have also agreed to set up a common governance structure to ensure overall coordination both at the political and technical level for the construction and operation of the cross-border Interconnection and to facilitate power trade between Cameroon and Chad. This common governance structure will also be essential for the sharing of information regarding security conditions and determining the implementation plan should violence or conflict impact construction. Detailed institutional and implementation arrangements are provided thereafter.

4. The GoC will be the Borrower of the IDA credit extended to Cameroon; the Government of Chad will be Recipient of the IDA grant extended to Chad. Each Government will transfer funds to the implementing agencies on their respective territories through Subsidiary Agreements.

5. PIMs will be prepared by SONATREL and SNE and approved by the World Bank one month after project effectiveness. The PIMs will provide guidance on project implementation arrangements at the level of each country, and



notably on roles and responsibilities within the implementation units set up by SONATREL and SNE, as well as on the technical, administrative, financial and accounting procedures, procurement arrangements, and the safeguard procedures adopted by the two agencies, in accordance with the respective national laws and regulations.

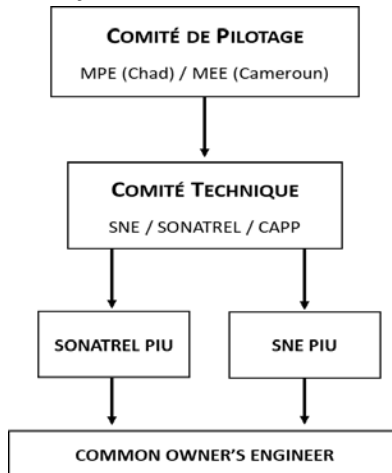
Governance structure

6. As envisaged under the 2009 Protocol Agreement, a CdP will be set up and placed under the joint authority of the Ministers in charge of Energy of the two countries to provide guidance on strategic and policy issues, as well as resolve issues requiring government decision. The CdP will comprise of representatives of the two ministries and the power sector regulators of Cameroon and Chad (ARSEL and ARSE) and may be joined by other relevant ministers as the need arise. The CdP shall meet as and when required, but at least once per year during project implementation.

7. A Joint CT placed under the joint authority of the Directors General of SONATREL and SNE will provide project supervision across the two countries, monitor progress for reporting to the CdP and address technical issues as they arise. The CT may call upon ad-hoc technical expertise as required including security experts and will comprise a representative of the CAPP Permanent Secretariat. The CT shall meet as and when required, but at least quarterly per year during project implementation. Emergency meetings will be called if there is a deterioration in the security situation.

8. While the Project will be separately implemented by SONATREL and SNE (as detailed thereafter), the two companies will jointly recruit a single consulting engineer to serve as COE, entrusted with supervision of construction works for the cross-border Interconnection from the Ngaoundere substation in Cameroon, to the Gassi substation in Chad, as envisaged under the AfDB project. ToRs for the COE position will be approved by the CT, which will also supervise its selection; once selected, the COE will enter into two separate contracts with SONATREL and SNE. COE costs on SONATREL side will be covered under financing provided by AfDB and on the SNE side under the proposed Project. The COE will manage tendering activities and supervise the work of contractors from selection to commissioning, as well as provide technical advice to SONATREL and SNE and the CT as needed. Institutional and implementation arrangements conditions are presented in Figure 1.1 below.

Figure 1.1: Project Institutional Structure



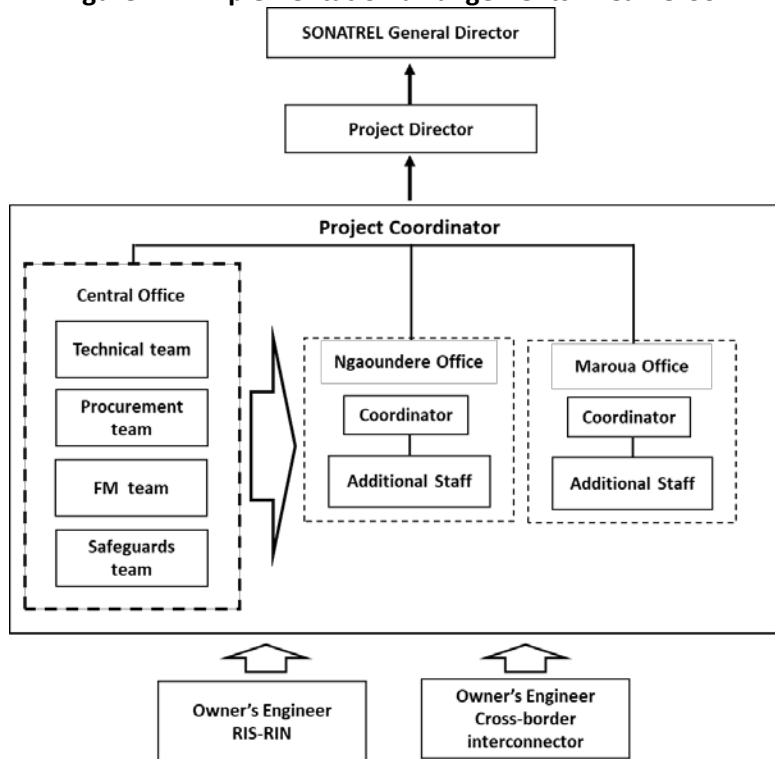
Project implementation in Cameroon

9. On the Cameroon side, the Project will be implemented by SONATREL through the establishment of a PIU (Figure



1.2). SONATREL’s General Director will be responsible for overall oversight of the Project, ensuring timely and effective construction and operation of the RIS-RIN Interconnection and the cross-border Interconnection, in coordination with project counterparts in-country and in Chad, as well as providing reporting to MINEE and other interested Government authorities. A senior SONATREL staff will be appointed as Project Director (PD) and provide close project supervision, reporting back to the General Director.

Figure 1.2: Implementation arrangements in Cameroon



10. The PIU will include a central office in Yaoundé and two local offices in Ngaoundere and Maroua respectively, given the distant locations involved with the Project. The PIU will be headed by a PC and shall include at minimum the following personnel: (i) a seasoned PS; (ii) a FMS; (iii) an Accountant; (iv) an ES; (v) a SDS; (vi) a M&E Specialist; (vii) a Technical Coordinator; and (viii) two Coordinators, of for each local offices. Fiduciary functions will be concentrated in the central office. Additional technical expertise, including Transmission, Substation, Distribution, SCADA and Civil Engineers, is expected to be needed, ideally to be assigned from SONATREL, or recruited with project funds during project implementation. Finally, SONATREL shall make available support and administrative staff for both the central and local offices, to minimize recruitment under the Project. The PIU will work under PD’s oversight and have responsibility for the day-to-day management of the Project, including: (i) ensuring the timely implementation of the Project in accordance with the PIM (see below); (ii) preparing annual work plans and budgets and annual procurement plans for submission to the World Bank for approval; and (iii) assuming overall responsibility for, inter alia, fiduciary tasks such as procurement and FM, compliance with the World Bank’s environmental and social safeguards, and also M&E, communication and citizen engagement. In particular the PS, FMS and Accountant will support procurement and FM for the Project. The ES and SDS will be responsible for the preparation and adequate implementation of safeguards instruments, including the

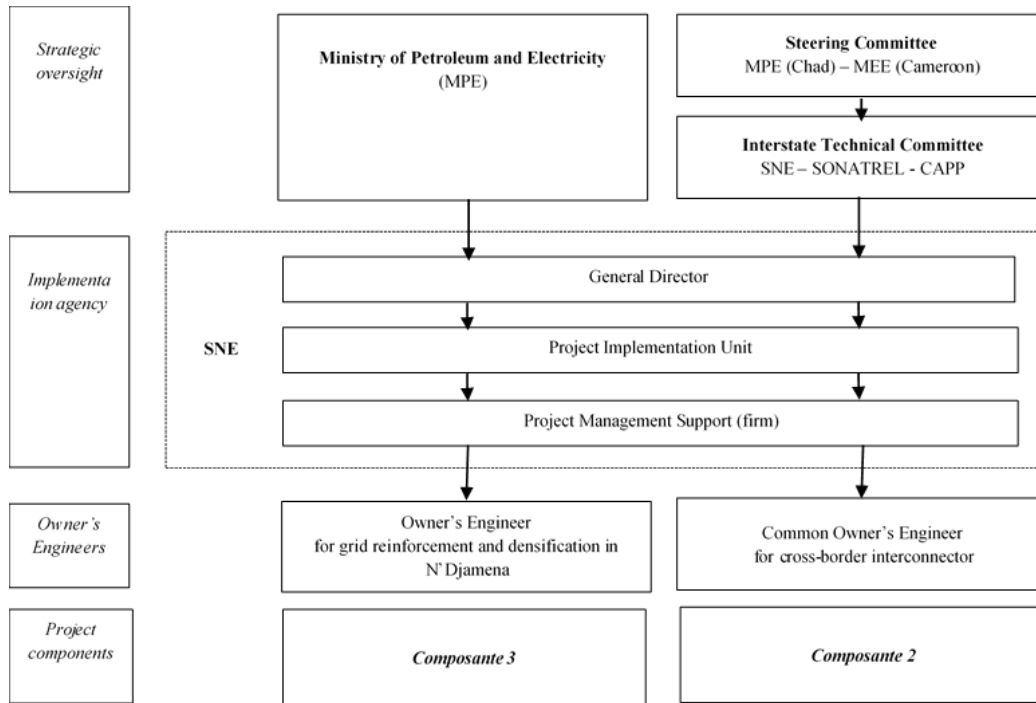


full ESIA and RAPs once the project sites and transmission line alignment have been identified. PIU staff will work closely with SONATREL departments to handle legal, technical, economic and financial issues as well as those relating to communication and public relations. The PC and all PIU key personnel will be competitively selected; ToRs are available, and the procurement process is well established. In general, the experience accumulated under the ETRP makes the PIU a well rooted model, anchored within SONATREL’s structure. Furthermore, the Project will rely on the same arrangements put in place for the ETRP concerning auditing and internal controls. It is expected that PC, PS, FMS, ES and SDS be in place by effectiveness; the recruitment of an Account shall be completed within one month of effectiveness.

11. SONATREL will also recruit and mobilize an Owner’s Engineer (SONATREL OE) to supervise preparatory and construction works for the RIS-RIN Interconnection and to interface with the COE jointly appointed by SONATREL and SNE to supervise the cross-border interconnection. SONATREL OE will be selected competitively and financed under the Project.

Project implementation in Chad

Figure 1.3: Implementation arrangements in Chad



12. In Chad, the Project will be implemented by the Chadian SNE. SNE has established a PIU reporting to senior management, which has the essential personnel needed for implementing the Project, including technical, project management, procurement, FM, environmental and social safeguards. However, the PIU will require support virtually in all areas of project implementation given that SNE does not have experience with World Bank-supported projects and faces capacity constraints. To this end, the PIU will be supported by a PMS consultancy firm, located in-house that will work in tandem with SNE PIU (Figure 1.3). This arrangement will provide SNE with the required skill mix to implement



project activities without delays. It will also enable the transfer of project management knowledge to SNE and its PIU through PMS support learning by doing, so that they could take over project management responsibilities within three years from the beginning of project implementation. The PMS consultant will be procured and contracted through the preparation advance and will be in place before project effectiveness. The PIU will be supported by: (i) an OE to supervise the implementation of Component 3; and (ii) the COE for supervision of the cross-border interconnection.

B. Financial management

Cameroon

Table 1.1: Assessment and Mitigation Measures of Project Risks

Risk	Risk rating	Risk Mitigating Measures Incorporated into Project Design	Risk after mitigation measures
<p>Country level Governance is widely acknowledged to be weak and may impact negatively the achievement of Project’s development objectives</p>	H	Donors community actions are oriented toward public financial management (PFM) reform agenda in support to the Government commitment to tackle the cross-cutting issue of Governance in the public resources’ management. Some donors foresee using the budget support instrument that could help accelerating the pace of the PFM and governance agenda.	H
<p>Entity level SONATREL is already implementing a project and might be overwhelmed with the new challenges coming from the new projects. These might undermine its ability to coordinate successfully the implementation of both projects</p>	H	Before the project becomes effective, a dedicated PIU will be created within SONATREL (implementing entity) and staffed with experienced fiduciary team.	S
<p>Project level Multiple stakeholders (many involved ministries and other power sector agencies) and involvement of SONATREL top management in the day-to-day management of the Project may jeopardize the coordination of the project activities</p>	S	The internal control system that will be built as detailed in the PIM will ensure that the Project is implemented in accordance with accepted procedures and segregation of duties. Roles and responsibilities of each stakeholder will be clearly defined and followed upon.	S
INHERENT RISK	H		S
<p>Budgeting Delays in the contracting of the Owners’ Engineers will prevent from having a credible budget in line with the procurement plan Other delays may occur in budget preparation and deviations may be experienced in budget execution of some components not captured by the reports Variations from budgets might not be authorized Difficulties in the mobilization of counterpart funding by the GoC for cash compensation and assistance PAP may delay</p>	H	<p>The bidding process for the recruitment of the OEs must start before effectiveness.</p> <p>The standardized FM manual will be customized to provide clear timeline and responsibilities for budget preparation, execution and monitoring.</p> <p>During negotiations, counterpart funds mobilization issues were discussed and the GoC confirmed their commitment to make funds available as and when</p>	S



project implementation		needed. It should be noted that PAP compensations have been estimated on a very tentative and conservative basis, since full safeguards instruments remain to be completed. Financing needs, and therefore counterpart funding, are likely to be smaller than the amount budgeted.	
Accounting Since the appointment of the PIU including the FM team is not completed yet, and an accounting software has not been set up to record the project transactions, there may be delays in the processing of financial information and submission of Financial Statements (interim and annual)	S	The FM officer will be recruited before effectiveness and the accountant will be recruited not later than three months following effectiveness, under ToRs acceptable to the World Bank. The accounting software currently in use for the ETRP, which is a multi-projects and multi-locations version, will be customized and deployed for the new PIU.	M
Internal Controls and Internal Audit The existing internal control system under the ETRP is not yet fully approved as the procedures manual is still in draft. In addition, SONATREL current system is weakened by the operationalization of its internal audit unit, yet to be established. These might undermine the ability of SONATREL to coordinate and implement the project activities within a sound internal control environment	S	The PIU to be established will be endowed with experienced staff with a good understanding of the functioning of the existing system. The PIM will include a clear description on the internal control environment including roles and responsibilities of each actor in the control process of project activities. The PIM will build on the one developed for the ETRP (not yet approved by the World Bank) and the standardized CAA procedures' manual. SONATREL internal audit unit will be reinforced to fulfill internal audit needs of the Project.	M
Funds Flow As there is not yet a dedicated account for the Project, there is a risk that project funds are diverted and used for non-project eligible purposes (e.g. funds may be mistakenly advanced in the DA of another project, for example ETRP implemented by SONATREL or DAs of other projects, as all the DAs are opened and managed by CAA). As huge amounts will have to be paid to contractors, the fund flows mechanism might not fit the project disbursement needs. Taxes associated to the significant amount of equipment that will need to be imported under the Project may take away funding from other activities Risk of non-mobilization /delayed mobilization of the counterpart funding due to the current tight economic context may hamper the project implementation pace	H	One (1) Designated Account (DA) will be opened in a stable commercial bank acceptable to the World Bank. Direct payment mechanism will be made available to the Project. An exemption of taxes and customs from the MoF may be requested. During negotiations, counterpart funds mobilization issues were discussed and the GoC confirmed their commitment to make funds available as and when needed.	M



Financial Reporting Delays may occur on the submission of agreed interim financial reports (IFRs) and annual project financial statements as the accounting scheme of SONATREL may not be appropriate for reporting requirements	S	The budgeting and accounting module of SIGED will be customized and deployed to ensure timely recording of financial information as well as timely production of quarterly and annual financial statements.	S
Auditing The existing external auditor of SONATREL, who is already in charge of the ETRP, may be overwhelmed by auditing two large projects (in addition to SONATREL itself) with same timeline; hence, delays may occur	H	The Project will rely on SONATREL external auditor. The audit firm will allocate dedicated teams to each of the projects audited in SONATREL. ToRs acceptable to World Bank will be prepared for the annual audit of financial statements and the audit of the internal control system.	S
CONTROL RISK	H		S
OVERALL FM RISK	H		S

Note: H = high; L = low; M = moderate; S = substantial

13. The proposed mitigation measures aim to lower the FM risk from High to Moderate or Low. However, considering the implementing entity capacity constraints, the residual FM risk is deemed to remain **Substantial**. This is due to the track record of SONATREL under the ongoing ETRP with regard to the timely and satisfactory implementation of mitigation measures. The FMS will provide appropriate capacity building to support SONATREL in the implementation of the mitigation measures, and the FM risk will be reassessed during project implementation.

Table 1.2: Financial Management Action Plan

	Action to be undertaken	Timeframe	Responsible body
1	Recruit the FM officer according to ToRs acceptable to the World Bank	Before effectiveness	SONATREL
2	As part of the PIM, complete the Financial Procedures Manual, building on the standardized Financial Management Manual of Procedures developed by CAA and the existing, though not yet finalized, procedures' manual of ETRP, both to be customized to reflect the Project's specificities	Not later than one month after effectiveness	PIU
3	Recruit the Accountant according to ToRs acceptable to the World Bank	Not later than three months after effectiveness	PIU
4	Customize and deploy the accounting software TOMPRO currently used by ETRP (multi-projects and multi-locations) to handle accounting and reporting needs under the Project	Not later than three months after effectiveness	PIU
5	Finalize the set-up of SONATREL internal audit unit	No later than three months after effectiveness	SONATREL
6	Submit to the World Bank ToRs acceptable to the World Bank for the external audit function, to be conducted by SONATREL's statutory auditor. The audit will consist of an annual financial audit of the financial statements of the Project and a review of the internal control system	No later than three months after effectiveness	PIU



Financial Management and Disbursement Arrangements

14. In line with the use of the country national system, the project FM arrangements will rely on the existing country FM arrangements put in place to manage donor-funded projects. These arrangements are centered on two main institutions: (i) the CAA, equipped with dedicated tools developed by the World Bank IDF; and (ii) the MINMAP in charge of ex-ante control of all suppliers' invoices associated with a contract before any payment is executed by CAA.

15. **Staffing.** The PIU will be responsible for the day-to-day implementation of FM activities and will be staffed with a qualified FM team comprised of an FM Specialist and an Accountant. Staff will be recruited based on ToRs acceptable to the World Bank. The team will be supported by SONATREL's internal audit unit as soon as this becomes operational. The team will ensure the transmission of financial data, archiving of financial data, and additional controls in order to ensure the accuracy and completeness of the project financial data, including guaranteeing that every transaction is duly authorized and properly recorded and that assets are safeguarded.

16. **Budgeting.** The overall responsibility for preparing an annual work plan and related budget will lie with the PIU. The different steps of budget management (preparation, revision, adoption, and execution) will be detailed in the FM procedures section of the PIM. The annual work plan and budget will be prepared yearly, submitted to the World Bank early enough to have them approved before the end of December of the previous year (or one month after the effective date of the first year of the Project), and then approved by the Steering Committee. A budget execution report will be included in a quarterly interim financial report to enable monitoring of project's implementation.

17. **Accounting Policies and Procedures.** The PIU, through its accounting team, will have the overall responsibility for maintaining the accounts of the project activities and ensuring that the annual financial statements are produced in a timely manner and in accordance with the accounting standards that are in effect in Cameroon.⁴⁴ The accounting software currently used for the ETRP, which is a multi-projects and multi-locations version, will be customized and deployed to record the Project's transactions and to produce the required periodic reports no later than two months after the Effectiveness date. The budget and accounting modules of the integrated FM system for donors funded project (SIGED) will be deployed at the PIU to handle accounting and reporting needs under the Project. Furthermore, when its current reporting systems, developed with the software provider Tomate, permit, CAA will open a dedicated window for the Project's users on the accounting and reporting module of its information system.

18. **Internal Control and Internal Auditing.** The administrative, financial, and accounting procedures will be part of the PIM. The manual will include a clear description of the initiation and approval processes with respect to segregation of duties. In that regards, the standardized Financial Management Manual of Procedures developed by CAA with World Bank's support as well as the procedures' manual for the ETRP (not yet finalized) will be customized to reflect the project specificities. The PIU will make use of the computerized accounting system to capture all project-related transactions. The FM Specialist will be responsible for maintaining all necessary controls to ensure that: (i) the project funds are used only for the intended purposes in an efficient and economical manner; (ii) periodic financial reports are prepared in an accurate, reliable and timely manner; and (iii) the Project's assets are adequately safeguarded. Also, Government's internal control arrangements will apply, such as the prior visa payment by the MINMAP for Project's invoices and the control by CAA over withdrawal applications and payments requests. In order to further enhancing the internal control system, the World Bank's loan and FM units will provide adequate training in disbursement and FM procedures to the

⁴⁴ The Accounting principles set out by *L'Organisation pour l'Harmonisation en Afrique du Droit des Affaires*—OHADA.



PIU. SONATREL does have an internal audit unit, but this is not yet operational. The set-up of that unit needs shall be finalized for the internal audit function to be effective; therefore, SONATREL may be relying on it to conduct the internal audit reviews.

19. **Financial Reporting and Monitoring.** The quarterly IFRs to be generated from the computerized FM system will be presented in accordance with the format agreed with the World Bank and submitted to the World Bank within 45 days of the end of each calendar quarter. The current content and format of the IFR used for the ETRP will continue to be used. The IFRs will normally include: (i) sources and uses of funds by type of project expenditures; (ii) a comparison of budgeted and actual project expenditures (commitment and disbursement) to date and for the quarter; (iii) a statement of the use of funds by component or activity; (iv) DA activity; and (v) a physical progress report on the implementation of the Project. At the end of each fiscal year, annual financial statements will be prepared for the Project.

20. **External Auditing.** The annual financial statements and quarterly IFRs prepared by the PIU as well as the internal control system will be subject to an annual audit by a reputable and independent auditing firm based on ToRs that are satisfactory to IDA. SONATREL will prepare ToRs for the external auditor, to be approved by the World Bank. The scope of the audit will be tailored to the Project's specific risks in accordance with World Bank's requirements and will be agreed upon with the GoC. In particular, the independent auditor will audit the use of all funds flowing from the DA to the ultimate beneficiaries. The Project will comply with the World Bank's access to information and disclosure policies by making of all disclosable audit reports publicly available promptly after receiving them. The Project's external auditor will be hired within six months of effectiveness. A single audit opinion, in compliance with International Standards on Auditing, will be issued and will cover all project receipts, payments, and accounts. The audited financial statements, along with the auditor's report and management letter (incorporating management's comments) covering any identified internal control and accounting system weaknesses, will be submitted to the World Bank within six months of the end of each financial year. If their availability and capacity permit, it would be considered involving the Chamber of Accounts (Supreme Audit Institution) in the auditor recruitment process.

21. **Funds Flow and Disbursement Arrangements.** Funds flow will rely on the Government's banking arrangements through CAA. CAA's Managing Director will continue to act as public accountant, which includes the signing authorization on all payments using the automated payments module of CAA information system for donor financing. Funds will flow from the IDA Account to one (1) DA denominated in XAF and opened in a reputable commercial bank in Cameroon that is acceptable to the World Bank. The DA will be managed according to the disbursement procedures described in the administrative, accounting, and financial procedures manual as part of the PIM, as well as the Disbursement Letter (DL). Upon effectiveness, the Project will follow transaction-based disbursement. The DA will receive an initial deposit equivalent to four (4) months expenditures forecast and will be replenished regularly through monthly Withdrawal Applications. Direct payment, reimbursement, and special commitment methods will be available to the Project and might apply as appropriate. Disbursements may eventually become report-based when the PIU reaches the capacity to produce reliable and acceptable IFRs. The minimum value of the direct payments, reimbursements and special commitments will be 20 percent of the DA ceiling.

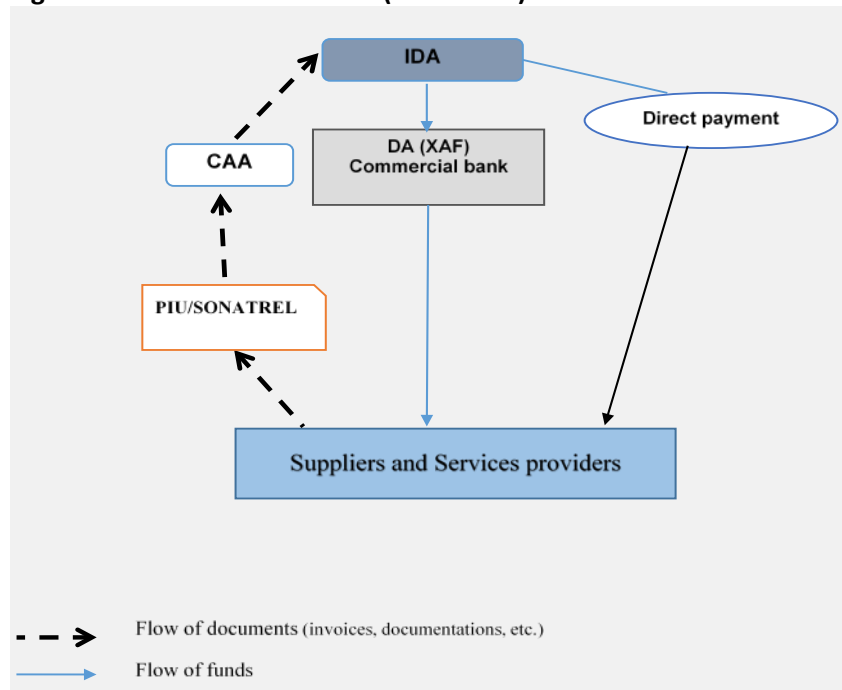
22. During implementation, as deemed necessary by the Recipient and the World Bank, a Transactions Account to which funds from the DA will be transferred may be opened in a commercial World Bank acceptable to the Association to meet eligible expenditures. This is subject to the transactions and balances in that account being included in all project financial reports. The Transaction Account would be replenished by CAA based on an agreed protocol that will be clearly

and formally stipulated with CAA.

Table 1.3: Eligible Expenditure per Category for Cameroon IDA Credit

Category	Amount of the Credit Allocated (expressed in EUR)	Percentage of Expenditures to be Financed (exclusive of Taxes)
(1) Works under Part 1.A of the Project	244,630,000	100%
(2) Goods, non-consulting services, consulting services, training and operational costs under Part 1 of the Project	26,670,000	100%
TOTAL AMOUNT	271,300,000	

Figure 1.4: Disbursement flow (Cameroon)



23. Since significant amount of equipment will be imported under the Project, resulting in a huge amount of taxes and customs to be paid, an exemption will be requested from the Ministry of Finance.



24. **Conclusions of the FM Assessment.** The overall FM residual risk at preparation is considered **Substantial**. The FM arrangements proposed for this Project are considered adequate and meet the World Bank’s minimum fiduciary requirements under World Bank IPF Policy and Directive.

Chad

Table 1.4: Project Risks and Mitigation

Risk	Risk rating	Risk Mitigating Measures Incorporated into Project Design	Risk after mitigation measures
<p>Country level Governance at the country level is widely acknowledged to be weak and may impact negatively the achievement of the Project’s development objectives.</p>	H	Efforts by the donor community are oriented toward a PFM reform agenda in support to the Government’s commitment to tackle the cross-cutting issue of governance in the management of public resources. Donors are financing programs and providing budget support in coordination with the IMF to promote the transcription of all the CEMAC directives into national laws to help accelerate the pace of the PFM and governance agenda. Project implementation will not follow the existing public finance management but rather the FM arrangements put in place for donor-funded projects in Chad.	H
<p>Entity level The project implementing entity is not yet set up (hence with capacity to be built), which might jeopardize the project activities coordination and implementation.</p>	H	The Government of Chad requested a preparation advance to help ensure project readiness for implementation. This includes the recruitment of a PMS consultancy firm to support SNE PIU with required skills. The PMS will be located in-house and will work in tandem with SNE PIU.	S
<p>Project level The Project will be operated in areas with high security risks (Far North of Cameroon) that may have an impact on the project’s overall performance, including activities implemented in Chad. The regional scope of the project could make it difficult to coordinate its activities and achieve expected results benefitting the two involved countries.</p>	H	<p>A third-party monitoring mechanism will be included in the project design as well as a Geo Enabling Monitoring System (GEMS) mapping of the Project’s activities in remote areas.</p> <p>The Project will include a component that aims to reinforce regional dialogue and data monitoring and dissemination. In addition, the internal control that will be built around the PIM will ensure that the Project is implemented in accordance with accepted procedures and segregation of duties. Roles and responsibilities of the various stakeholders will be clearly defined in the project’s manuals (PIM and unified FM Procedures Manual).</p>	S
INHERENT RISK	H		S
Control Risk			
<p>Budgeting The elaboration of a credible budget in line with the procurement plan, to be submitted</p>	S	The unified FM Procedures Manual in use for all the World Bank-funded projects in Chad will be tailored	M



Risk	Risk rating	Risk Mitigating Measures Incorporated into Project Design	Risk after mitigation measures
to the World Bank no later than November 30 th of each calendar year as required in the Legal Agreement, might be an issue as SNE PIU may lack experience in budget elaboration, execution and monitoring. In addition, the Project might experience deviations from budgets that might not be authorized.		to the project specificities and include a clear timeline and responsibilities for budget preparation and monitoring.	
<p>Accounting</p> <p>SNE PIU is not yet operational and lack an accounting system. Hence, the Project may experience delays in the treatment of financial information and in submissions of Financial Statements (interim and annual).</p>	H	The PMS consultancy firm that will support SNE PIU will include the required skills in FM. In addition, an accounting software will be installed at the PIU in order to fulfill the accounting and reporting needs for the activities under its responsibility.	S
<p>Internal Controls and Internal Audit</p> <p>Absence of an FM procedures manual and a project implementation manual specific to the Project might hamper implementation and coordination.</p>	H	The FM procedures manual will include a clear description on the internal control environment including description of the project activities, fiduciary procedures and role and responsibilities of each actor involved in the project's activities control process.	S
<p>Funds Flow</p> <p>As there is not yet a dedicated account for the Project, there is a risk that the project funds are diverted and used for non-project eligible purposes (e.g. project's funds may be misused to finance SNE's activities, as the SNE PIU is established within SNE).</p> <p>Delays in funds flow.</p>	S	<p>One (1) DA will be opened in a commercial bank acceptable to the World Bank and managed by SNE PIU.</p> <p>Annual external audits are required of Project's DA, and separate opinion on Statement of Expenditures (SoEs) will be issued by external auditors.</p> <p>Disbursement will be based on SoEs method.</p> <p>SNE PIU will be reinforced by external consultants with experience in IDA-funded projects to be able to prepare and submit acceptable withdrawal applications to World Bank.</p> <p>DA will be opened within one (1) month after project effectiveness.</p>	S
<p>Financial Reporting</p> <p>There might be delays in the submission of agreed IFRs and annual project financial statements as SNE PIU is not yet functional and its staff and accounting software are not yet place.</p>	H	The PMS consultancy firm will include the required skills in FM and will equipped by an appropriate accounting software that will be customized and deployed to ensure timely recording of financial information as well as timely production of quarterly and annual financial statements.	S



Risk	Risk rating	Risk Mitigating Measures Incorporated into Project Design	Risk after mitigation measures
Auditing The Project might not be audited as no auditor has been recruited and the court of accounts of Chad is not yet equipped to conduct such audit in accordance with World Bank requirements.	S	An external auditor will be recruited according to ToRs acceptable to the World Bank to conduct external audit of the Project’s accounts on a yearly basis; the report will be furnished to the World Bank within six (6) months of the end of the Recipient’s fiscal year.	M
CONTROL RISK	H		S
OVERALL FM RISK	H	Fiduciary residual risk is rated as Substantial because SNE currently lacks minimal fiduciary capacities to manage IDA resources.	S

Risk rating: H (High Risk), S (Substantial Risk), M (Modest Risk) N (Negligible or Low Risk)

25. The overall residual FM risk is considered as **Substantial**, although the proposed mitigating measures should lead to lower it to Moderate or Low. This is justified by the fact that, with no experience of SNE in managing World Bank-financed projects, its capacity to implement the proposed mitigating measures is not guaranteed, specifically in relation to timely and adequate staffing and transfer of competences by the PMS, and to timely and quality production of the Project’s Implementation and Financial Procedures Manuals. The FMS will provide appropriate capacity building to support SNE in the implementation of the mitigation measures, and the FM risk will be reassessed during the project implementation.

Table 1.5: Key Weaknesses and Action Plan to Reinforce the Control Environment

	Actions to be undertaken	Timeframe	Responsible body
1	Recruit a PMS consultancy firm with required all the skills essential for the proper conduct of project, including technical, project management, procurement, FM, environmental and social safeguards.	By effectiveness	SNE
4	Elaborate and adopt a PIM in form and content satisfactory to World Bank.	Within one (1) month following effectiveness	SNE
5	Appoint or recruit crucial staff to reinforce SNE PIU, including (i) a FMS; (ii) an Accountant; and (iii) an Internal Auditor.	Within five (5) months following effectiveness	SNE / PMS
6	Adapt and adopt the unified FM procedures manual in use for the overall World Bank-funded projects implemented in Chad, to reflect the specificities of the proposed project.	Within six (6) months following effectiveness	SNE / PMS
7	Acquire and install a “multi-project” computerized accounting system to fit project needs and generate useful information and financial statements.	Within six (6) months following effectiveness	SNE / PMS
8	Recruit an independent external auditor, with terms of reference and qualifications acceptable to the Association.	Within six (6) months following effectiveness	SNE / PMS



Financial Management arrangements

26. **Budgeting and planning.** The budgeting process (preparation, adoption, execution and revision) will be clearly defined in the budget section of the unified FM Procedures Manual that will be adapted to the Project's specifics. The budget will be reviewed and adopted by the project Steering Committee before the end of the calendar year, i.e. not later than November 30 each year and, in any case, early enough to have them approved and included in the national budget law as appropriate. Annual budgets adopted by the Steering Committee will be submitted to the World Bank's non-objection before implementation. Budgets should be regularly monitored at all levels. Approved annual budgets should be at least quarterly monitored against actual expenditure. The gaps will be adequately explained and justified through the semi-annual IFRs.

27. **Accounting policies and procedures.** The current OHADA accounting standards (SYSCOHADA) in use in West and Central African Francophone countries will be used for the Project. Project's accounts will be maintained on an accrual basis, supported by appropriate records and procedures to track commitments and to safeguard assets. Annual financial statements will be prepared by SNE PIU supported by PMS consultancy firm, in accordance with the SYSCOHADA and World Bank's requirements. Accounting and control procedures will be documented in the unified FM procedures manual to be adapted to the project's specificities, within six months after project effectiveness.

28. **Accounting staff.** An FMS and an Accountant will be appointed or recruited on a competitive basis specifically for the Project, within five months after effectiveness, and will be trained by the PMS consultancy firm. The latter will be recruited through the PPA and will be in place by project effectiveness.

29. **Accounting software.** For the purpose managing the proposed Project, recording and reporting on the use of the funds in a timely manner, an appropriate accounting software will be procured and installed by SNE PIU, within six months after project effectiveness. The accounting software would allow for the preparation of withdrawal applications and periodic financial reports (IFRs and annual financial statements). The FM staff will be trained on using the accounting system. SNE PIU team will keep records on Excel spreadsheet until the accounting system is acquired and installed.

30. **Internal controls systems.** The unified FM Procedures Manual in use for all World Bank-funded projects in Chad will be adjusted to the specificities of the proposed Project, within six months after project effectiveness. In addition, a PIM will be prepared by SNE and approved by the World Bank within one month following effectiveness. The PIM and the FM manual will provide guidance on project implementation arrangements, and notably on roles and responsibilities within the implementation unit set up by SNE, as well as on the technical, administrative, financial and accounting procedures, procurement arrangements, and the safeguard procedures adopted by the project implementing agency, in accordance with the respective national laws and regulations. SNE PIU, supported by the PMS consultancy firm will be responsible for maintaining all necessary controls to ensure: (i) that the project funds are used only for the intended purposes along economy and efficiency principles; (ii) the preparation of accurate, reliable, and timely periodic financial reports; and (iii) that the Project's assets are adequately safeguarded. In addition to the support of the PMS, to sustain the capacity building initiatives of the project team, the World Bank loan and FM units will provide adequate training on disbursement and FM procedures to the PIU's FM team. All of these measures aim at further enhancing the internal control.

31. **Internal auditing.** To provide reasonable assurance on the project transactions, an internal auditor will be appointed or recruited by SNE PIU, within five months after project effectiveness and will be trained by the PMS



consultancy firm. The internal auditor will develop audit charts and annual audit plans using a risk-based approach. He/she will be responsible for the close monitoring of the implementation of the action plans aimed at addressing weaknesses revealed during supervision and audit missions.

32. **Financial reporting and monitoring.** For this project, SNE PIU will prepare semi-annual unaudited IFRs which will be submitted to the World Bank within forty-five days of the end of the semester. At a minimum, the financial report will include: (i) a statement of sources and uses of funds and opening and closing balances for the semester and cumulative; (ii) a statement of uses of funds that shows actual expenditures appropriately classified by main project activities (categories, sub-components) including comparison with budget for the semester and cumulative; (iii) a statement on movements (inflows and outflows) of the DA including opening and closing balances; (iv) a SoE forecast for the next semester together with the cash requirement; (v) notes and explanations; and (vi) other supporting schedules and documents. In addition, and in compliance with IDA requirements, SNE PIU will produce annual project financial statements (PFS) similar to the contents of the semi-annual IFRs. These financial statements will comply with the accounting system implemented in the sub-region (SYSCOHADA) and will be submitted for audit within three months after the end of each Recipient's fiscal year.

33. **External audit.** The annual financial statements and semi-annual IFRs prepared by SNE PIU as well as the internal control system will be subject to an annual audit by a reputable and independent auditing firm based on terms of reference that are satisfactory to IDA. The scope of the audit will be tailored to the Project's specific risks in accordance with World Bank's requirements and will be agreed upon with the Government. In particular, the independent auditor will audit the use of all funds flowing from the DA to the ultimate beneficiaries. The Project will comply with the World Bank's access to information and disclosure policies by making of all disclosable audit reports publicly available promptly after receiving them. The Project's external auditor will be hired within six months of effectiveness. A single audit opinion, in compliance with International Standards on Auditing, will be issued and will cover all project receipts, payments, and accounts. The audited financial statements, along with the auditor's report and management letter (incorporating management's comments) covering any identified internal control and accounting system weaknesses, will be submitted to the World Bank within six months of the end of each Recipient's fiscal year. In order to ensure the timely carrying out of the audits referred to in the above paragraph, the Recipient, through SNE PIU, shall recruit not later than six months after effectiveness the external auditor pursuant to terms of reference satisfactory to the World Bank.

Funds Flow and Disbursement Arrangements

34. **Disbursements arrangements.** The disbursement methods to be used under this Project will be based on the Disbursement Guidelines for IPF, dated February 2017. Upon effectiveness, this operation will follow the transaction-based disbursement method. Direct payment, reimbursement, and special commitment methods will be available to the Project and might apply as appropriate. The minimum value of the direct payments, reimbursements and special commitments will be 20 percent of the DA ceiling. Further details about disbursements to the Project will be included in the disbursement procedures described in the Disbursement and Financial Information Letter (DFIL) and the unified FM Procedures Manual.

35. **Banking arrangements.** SNE PIU will open one segregated DA within one month after project effectiveness. It will be denominated in Central African CFA franc (XAF) in a commercial bank acceptable to the World Bank on terms and conditions acceptable to the World Bank. The Project's DA will function under the double signature of the PC and the FMS. Until the FMS is recruited, transitional arrangements will be set up to allow a smooth implementation of the Project.



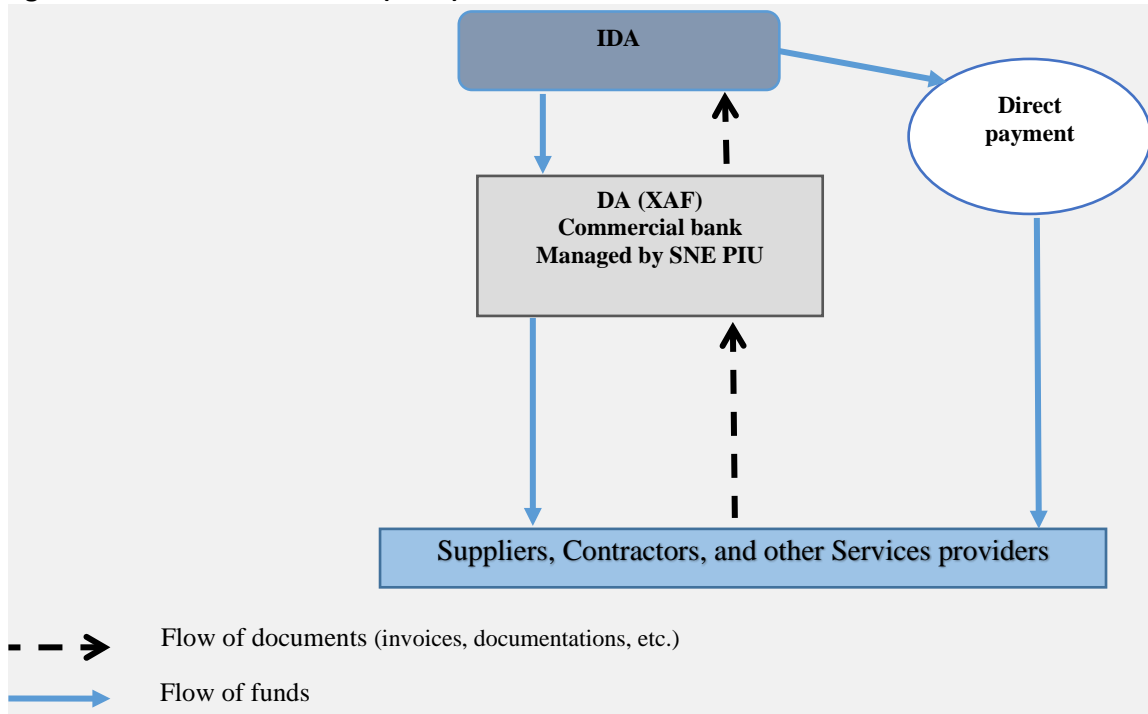
36. **Flow of funds arrangements.** Funds flow arrangements for the project (through the DA above) are as follows:
- (i) IDA will make an initial advance disbursement into the DA in Central African CFA (XAF) upon receiving a withdrawal application from the project implementing agency. The amount of the initial advance will be defined in the DFIL;
 - (ii) Replenishment of funds from IDA to the Project’s DA will be made upon evidence of satisfactory utilization of the advance, reflected in SoEs and/or on full documentation for payments above SoEs thresholds. Replenishment applications would be required to be submitted regularly on a monthly basis. Further details will be included in the disbursement procedures described in the DFIL. If the DA remains inactive for more than six months, the Borrower may be requested to refund to IDA the amounts advanced to the DA. IDA will have the right, as reflected in the Legal Agreement, to suspend disbursement of the Funds if reporting requirements are not complied with.

Table 1.6: Eligible Expenditure per Category for Chad IDA Grant

Category	Amount of the Grant Allocated (expressed in SDR)	Percentage of Expenditures to be Financed (inclusive of Taxes)
(1) Works:		100%
(a) under Part 2.F of the Project	24,895,000	
(b) under Parts 3.A.1, 3.A.2 and 3.A.3 of the Project	19,038,000	
(2) Goods, non-consulting services, consulting services, training and operational costs under Parts 2.H and 3 of the Project	11,716,000	100%
(3) Un-allocated	6,590,000	
(4) Refund of Preparation Advance	3,661,000	Amount payable pursuant to Section 2.07 (a) of the General Conditions
TOTAL AMOUNT	65,900,000	



Figure 1.5: Disbursement Flow (Chad)



37. **Conclusion of the FM Assessment.** The overall residual FM risk is considered **Substantial** for SNE PIU. The proposed FM arrangements are considered adequate subject to the implementation of the mitigation measures and will meet the World Bank’s minimum requirements under World Bank Policy and Procedure for IPF operations, to provide, with reasonable assurance, accurate and timely information on the status of the Project as required by the IDA.

FM Implementation Support Plan

38. The intensity and frequency of support on FM matters will be in line with a risk-based approach and will involve collaboration with the entire project task team. A first comprehensive implementation support mission will be performed six months after the project effectiveness. Afterwards, the missions will be scheduled depending on risk and will include the following diligences: (i) monitoring of FM arrangements during supervision, at intervals determined by the risk rating assigned to the overall FM Assessment at entry and subsequently during Implementation (ISR); (ii) integrated fiduciary review on key contracts; (iii) review of IFRs; (iv) review of audit reports and management letters from the external auditors and follow-up on material accountability issues by engaging with the Project Task Team Leader, Recipient, and/or Auditors – the quality of the audit (internal and external) is also to be monitored closely to ensure that it covers all relevant aspects and provides enough confidence on the appropriate use of funds by recipients; (v) physical supervision on the ground directly or using GEMS technology; and (vi) assistance to build or maintain appropriate FM capacity and efficient internal control system.



C. Procurement

39. **Applicable procurement rules and procedures.** Procurement for goods, works, and non-consulting and consulting services will be carried out in accordance with the procedures specified in the World Bank Procurement Regulations, dated July 2016 and as revised in November 2017 and August 2018 (Procurement Regulations), as well as the provisions stipulated in the Financing Agreement. The possibility to use alternative arrangements is addressed in par. 113 of the main document.

40. Contracts to be financed by AfDB and the World Bank respectively, under separate procurement and following their respective procedures, have been clearly identified. There might be a need for the World Bank to cover part of the costs of a work contract in Chad that is expected to be financed by AfDB. This can only be confirmed at implementation stage. Furthermore, the COE entrusted with supervision of the cross-border interconnection will have to be jointly selected by SONATREL and SNE, based on ToRs agreed by the two implementing agencies, AfDB and IDA and resulting in the selection of a single firm to ensure consistency of the technical requirements. Shall the need arise, the Bank will explore the possibility to adopt AfDB's procedures to procure the work contract and the OE contract in Chad through an Alternative Procurement Arrangement (APA) agreement. If this is not feasible, the World Bank may consider the direct contracting of the firms selected based on AfDB's procedures, upon positive evaluation of the procurement process that has been carried out.

41. **Fraud, coercion, and corruption.** The Project's procurement activities will be carried out in accordance with the Anticorruption Guidelines (Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants", dated October 15, 2006 and revised in January 2011 and as of July 1, 2016.

42. **Procurement documents.** For international competitive procurement of goods, non-consulting services, and consulting services, the Recipients shall use the World Bank's Standard Procurement Documents with minimum changes, acceptable to the World Bank, as necessary to address any project specific conditions.

43. For National competitive of Procurement of Goods, as of today, the National Standard Bidding documents in Chad and Cameroon contain major deviations from the World Bank's procedures. The Recipients shall use World Bank's Standard Procurement Documents with minimum changes, acceptable to the World Bank, as necessary to address any project-specific conditions.

44. **Procurement information and documentation, filing and database.** Procurement information will be recorded and reported by PIUs as follows:

- (a) Complete procurement documentation for each contract, including bidding documents, advertisements, bids received, bid evaluations, letters of acceptance, contract agreements, securities, and related correspondence will be maintained at the level of respective ministries in an orderly manner, readily available for audit.
- (b) Contract award information will be promptly recorded and contract rosters, as agreed, will be maintained.
- (c) Comprehensive quarterly reports will be prepared, indicating: (i) revised cost estimates, where applicable, for each contract; (ii) status of ongoing procurement, including a comparison of originally planned and actual dates of the procurement actions, preparation of bidding documents, advertising, bidding, evaluation,



contract award, and completion time for each contract; and (iii) updated Procurement Plans, including revised dates, where applicable, for all procurement actions.

45. **Advertising Procedure.** General Procurement Notice, Specific Procurement Notices, Requests for Expression of Interest, and results of the evaluation and contracts award should be published in accordance with advertising provisions in the Procurement Regulations.

46. For request for bids and request for proposals that involve international bidders/consultants, the contract awards shall be published in the United Nations Development Business in line with the provisions of the Procurement Regulations. For works and goods, the information to publish shall specify: (i) the name of each bidder who submitted a bid; (ii) bid prices as read out at bid opening; (iii) the name and evaluated prices of each bid that was evaluated; (iv) the names of bidders whose bids were rejected and the reasons for their rejection; and (v) the name of the winning bidder and the price it offered, as well as the duration and summary scope of the contract awarded.

47. For consultants, the following information must be published: (i) names of all consultants who submitted proposals; (ii) technical points assigned to each consultant; (iii) evaluated prices of each consultant; (iv) final point ranking of the consultants; and (v) the name of the winning consultant and the price, duration, and summary scope of the contract. The same information will be sent to all consultants who submitted proposals.

48. For other contracts, the information should be published in national/regional gazette periodically (at least, quarterly) and in the format of a summarized table covering the previous period with the following information: (i) the name of the bidder/consultant to whom the contract was awarded; (ii) the price; (iii) duration; and (iv) scope of the contract.

49. **Training, workshops, study tours and conferences.** Training (including training material and support), attendance to workshops and conferences based on individual or group needs, and on-the-job training, will be carried out based on an approved annual training and workshop/conference plan, which would identify the general framework of training activities for the year. A detailed plan and terms of reference providing the nature of training/workshop, number of trainees/participants, duration, staff months, timing, and estimated costs will be submitted to IDA for review and approval before initiating the process. The appropriate methods of selection will be derived from the detailed schedule. After the training, each beneficiary will be requested to submit a brief report indicating what skills have been acquired and how these skills will contribute to enhance his/her performance and contribute to the attainment of the PDO. Reports by the trainees, including completion certificate/diploma upon completion of training, shall be provided to the PCs, will be kept as parts of the records, and will be shared with the World Bank if required.

50. **Manual.** Procurement arrangements, roles and responsibilities, methods, and requirements for carrying out procurement activities shall be elaborated in detail in the Procurement section of the PIM. The manual shall be prepared/updated by the Recipients and agreed with the World Bank one month after effectiveness date.

51. **Operating costs.** Operating costs financed by the Project are incremental expenses, incurred by the PIUs or its regional representations, based on the Annual Work Plans and Budgets as approved by IDA, on account of project implementation, management, and M&E, including office supplies, bank charges, vehicles operation, maintenance and insurance, maintenance of equipment and buildings, communication costs, travel and supervision costs (that is, transport, accommodation, and per diem), the costs related to utilities and office space rental and salaries of contracted



and temporary staff. The related goods/services will be procured using the procurement procedures specified in the PIM and accepted and approved by the World Bank.

Assessment of the Project Implementing Agencies to Implement Procurement

52. The procurement activities for the Project will be executed by Project Implementing Agencies notably SONATREL (for CAMEROON) and SNE (for Chad) through their respective PIUs. The PIUs will carry out the following activities: (a) managing the overall procurement activities and ensuring compliance with the procurement process described in the relevant manuals; (b) ensuring compliance of bidding documents, draft requests for proposals, evaluation reports, and contracts with World Bank procedures; (c) preparing and updating the Procurement Plan; (d) monitoring the implementation of procurement activities; (e) developing procurement reports; and (f) seeking and obtaining approval of internal designated entities and then of IDA on procurement documents, as required. The PIUs will participate in the process of all procurement activities and will notably support the following activities: (a) preparation of ToRs and the bidding documents; (b) preparation of evaluation reports and contracts related with World Bank procedures; and (c) participation in procurement commission activities and all related meetings. Detailed Assessments for respective implementing agencies are detailed below.

Cameroon

53. An assessment of the capacity of SONATREL to implement procurement activities was carried out, which reviewed the organizational structure for implementation of the project, the PIU to put in place, and the interaction between the different agencies involved in the Project.

54. SONATREL is implementing another World Bank-financed project (ETRP) through a PIU. This experience is at the beginning; thus, there is a need to put in place a dedicated PIU and equip it with the needed technical and fiduciary staff including procurement.

55. The key procurement risks identified for the Project are as follows: (i) staff involved in the Project may not have sufficient knowledge of the NPF and/or there is a risk of confusion with previous sets of guidelines; (ii) there is lack of proficient procurement staff to implement actions on time and in line with the NPF; (iii) inadequate communication and interaction between the beneficiaries and the PIU may lead to delays in the procurement processes and poor cost estimations; (iv) administrative routines may increase delays in the procurement processes and affect project implementation; (v) the procurement in a specialized market in fragile area with few bidders can restrict competition and possibly increase prices and collusion risks; (vi) there may be poor contract management and administration of big contracts; and (vii) poor filing of documents may lead to loss of documents. Overall, all these risks can cause misprocurement, possible delays in evaluation of bids, and technical proposals leading to implementation delays, poor quality of contract deliverables, and reputational risks to the World Bank and the Project.

56. The overall procurement risk for the project is rated High. The residual risk will be *moderate* after adopting the agreed mitigation action plan summarized in Table 1.7.



Table 1.7: Action Plan Mitigation Measures (Cameroon)

Risk	Action	Responsibility	Date
1. Staff involved in the Project may not have enough knowledge of the NPF and/or risk of confusion with the former guidelines.	Hire, on a competitive basis, a PS who is experienced and familiar with World Bank procurement procedures and policies.	SONATREL	Before effectiveness
	Nominate SONATREL to be trained and by the PIU's PS, in order to be empowered onto procurement office responsibilities, and promote knowledge transfer.	SONATREL	Two months after effectiveness
	Organize workshop sessions on the NPF to train all staff involved in the procurement of the Project.	SONATREL/PIU/ World Bank	Two months after effectiveness
	Continuous hands-on trainings on the NPF for identified key staff.	SONATREL/PIU/ World Bank	During the life of the Project
2. Inadequate communication and interaction between the beneficiaries and the PIU which may lead to delays in procurement processes and poor estimation of the costs.	Develop a procurement section in the PIM to clarify the role of each team member involved in the procurement process of the Project and the maximum delay for each procurement stage, specifically concerning the review, approval system, and signature of contracts.	SONATREL/PIU	One month after effectiveness
3. Internal administrative procedures may increase delays in the procurement processes and affect project implementation.	Exercise quality control on all aspects of the procurement process, including developing ToRs, technical specifications, bidding documents, proposals, request of quotations, evaluation, and award.	PIU	During the life of the Project
	Monitor, on regular basis, the Procurement Plan's implementation and set up a close follow-up in relation with beneficiaries to ensure that appropriate actions are taken on time.	PIU	During the life of the Project
	Onboarding of Owners' Engineers with procurement and contracts management experts from the early stage of project implementation.	SONATREL/PIU/	At the beginning of Owners 'Engineer contract
	Market engagement/ sounding/ outreach for the large OPRC contracts to better understand evolving market and solutions offered	SONATREL/PIU/	
	Transfer the major risks (identified in the PRAMS exercise) to a day-to-day monitoring matrix and monitor it through monthly meetings with the Client during the first two years of the Project, to make sure things are on track	SONATREL/PIU/ World Bank	During the first two years of the Project
4. Poor contract management and administration of big contracts.	Develop contract management plans for prior review.	SONATREL/PIU	Two months after effectiveness
	Keep the large value Works and OE contracts on team's radar for regular follow-ups with support from technical and safeguard team members, as may be needed review.	SONATREL/PIU/ World Bank	During the life of the Project



5. Procurement in a specialized market in a fragile area with few bidders can restrict competition and possibly increase prices and collusion risks.	Organize training on procurement red flags in collaboration with INT (Preventive) for implementing agencies at appropriate time.	SONATREL/PIU/ World Bank	Two months after effectiveness
6. Poor filing which can lead to loss of documents.	Improve the filing system at the PIU level to ensure compliance with World Bank procurement filing manual.	PIU/PS	During the life of the Project

Chad

57. In Chad, the current public procurement system is governed by the public procurement code adopted in December 2015 (Decree No 2417/PR/PM/2015), as well as subsequent texts including the Decrees relating to: (i) the organization and functioning of the Directorate for the Control of Public Procurement (*Direction Generale de Controle des Marches Publics*); (ii) the organization and functioning of the Regulatory Authority for Public Procurement (*Autorite de Regulation des Marches Publics*); and (iii) thresholds for awards, control and approval of procurement contracts. In addition to these decrees, implementing decrees were published in November 2016 and include standards Bidding Documents for Works; Goods and Non- consulting Services; and Consulting services.

58. An assessment of the capacity of SNE to implement procurement activities of the Project was carried out by the World Bank’s Senior PS based in the local office. The assessment reviewed the organizational structure for implementation of the Project, the PIU to put in place, and the interaction between the different stakeholders involved in the Project. The assessment revealed that: (1) SNE has no experience in implementing World Bank-financed projects; and (ii) there is a need to put in place a dedicated PIU and equip it with the needed technical and fiduciary staff including procurement.

59. Procurement risks for the Project arise from the current public procurement country system characterized by : (i) delays in the approval of bid evaluation reports; (ii) long delays observed in signing off and approval of contracts due to the low procurement prior-review threshold and the low procurement approbation threshold; and (iii) poor contract management. In addition: (i) staff involved in the Project may not have sufficient knowledge of the NPF and/or there is a risk of confusion with previous sets of guidelines; (ii) there is lack of proficient procurement staff to implement actions on time and in line with the NPF; and (iii) a PIM with procurement provisions in line with the World Bank’s procurement regulations is lacking.

60. The overall procurement risk for the project is rated High. The residual risk will be **Substantial** after adopting the agreed mitigation action plan summarized in Table 1.8.

Table 1.8: Action Plan Mitigation Measures (Chad)

Risk	Action	Responsibility	Date
1. Delays in the approval of bid evaluation reports	Organize workshop sessions on the NPF to train all staff involved in the procurement of the Project	SNE/PIU/World Bank	Two months after effectiveness
	Continuous hands-on trainings on the NPF for identified key staff	SNE/PIU/World Bank	During the life of the Project



2. Important delays in signing off and approval of contracts due to the low procurement prior review threshold and the low procurement approbation threshold	Exercise quality control on all aspects of the procurement process, including developing ToRs, technical specifications, bidding documents, proposals, request of quotations, evaluation, and award	SNE/PIU	During the life of the Project
	Monitor, on regular basis, the implementation of the Procurement Plan and set up a close follow-up in relation with beneficiaries to ensure that appropriate actions are taken on time	SNE/PIU	During the life of the Project
	Onboarding of Owners' Engineers with procurement and contracts management experts from the early stage of project implementation	SNE/PIU	At the beginning of OE contract
	Market engagement/ sounding/ outreach for the large OPRC contracts to better understand evolving market & solutions offered	SNE/PIU	
	Transfer the major risks (identified in the PRAMS exercise) to a day-to-day monitoring matrix and monitor it through project implementation monthly meetings with the Client during the first two years of the Project, to make sure things are on track	SNE/PIU/World Bank	During the first two years of the Project
3. Weak quality of the contract management and administration of big contracts	Develop contract management plans for prior review	SNE/PIU /World Bank	Two months after effectiveness
	Keep the large value Works and OE contracts on team's radar for regular follow-ups with support from technical and Safeguard team members, as may be needed review	SNE/PIU/World Bank	During the life of the Project
4. Staff involved in the Project may not have enough knowledge of the NPF and/or risk of confusion with the former guidelines	Hire, on a competitive basis, a PS who is experienced and familiar with World Bank procurement procedures and policies	SNE	Before effectiveness
	Nominate one SNE staff to be trained, coached continuously by the Procurement specialist, in order to be empowered onto procurement office responsibilities, and promote knowledge transfer	SNE/PIU/PS	Two months after effectiveness
	Organize workshop sessions on the NPF to train all staff involved in the procurement of the project	SNE/PIU/World Bank	Two months after effectiveness
	Continuous hands-on trainings on the NPF for identified key staff	SNE/PIU/World Bank	Throughout the life of the Project
5. Absence of a procedures' manual with procurement provisions in line with the World Bank's procurement regulation	Elaborate PIM to clarify the role of each team member involved in the procurement process of the project and the maximum delay for each procurement stage	SNE	One month after effectiveness



D. Implementation support plan

61. **Implementation support will begin as early as possible to prepare the Government and the implementing agencies ahead of the first disbursement.** World Bank team members for procurement, FM, and environmental and social safeguards based in Yaounde and N’Djamena will ensure timely support to the Clients. Formal supervision and field visits will be carried out at least three time a year. The tables below detail the Implementation Support Plan and World Bank resourcing requirements.

Table 1.9: Implementation Support Plan

Time	Focus	Skills needed	Resource estimate
First 12 months	<ul style="list-style-type: none"> - Build capacity for project management - Build capacity for procurement, FM, and safeguards 	<ul style="list-style-type: none"> - Project management - Energy expert - Procurement - Financial management - Social and environment safeguards 	US\$175,000, including US\$50,000 of travel
12-60 months			US\$400,000, including US\$40,000 of travel per year

Table 1.10: Summary of World Bank Skills Mix Requirement

Skills needed	Number of staff weeks	Number of trips
Task Team Leader	25	12
Co-Task Team Leader	25	12
Operations Advisor	10	5
Energy Expert	12	12
Financial Management	8	4
Procurement	8	4
Environmental Safeguards	8	4
Social Safeguards	8	4

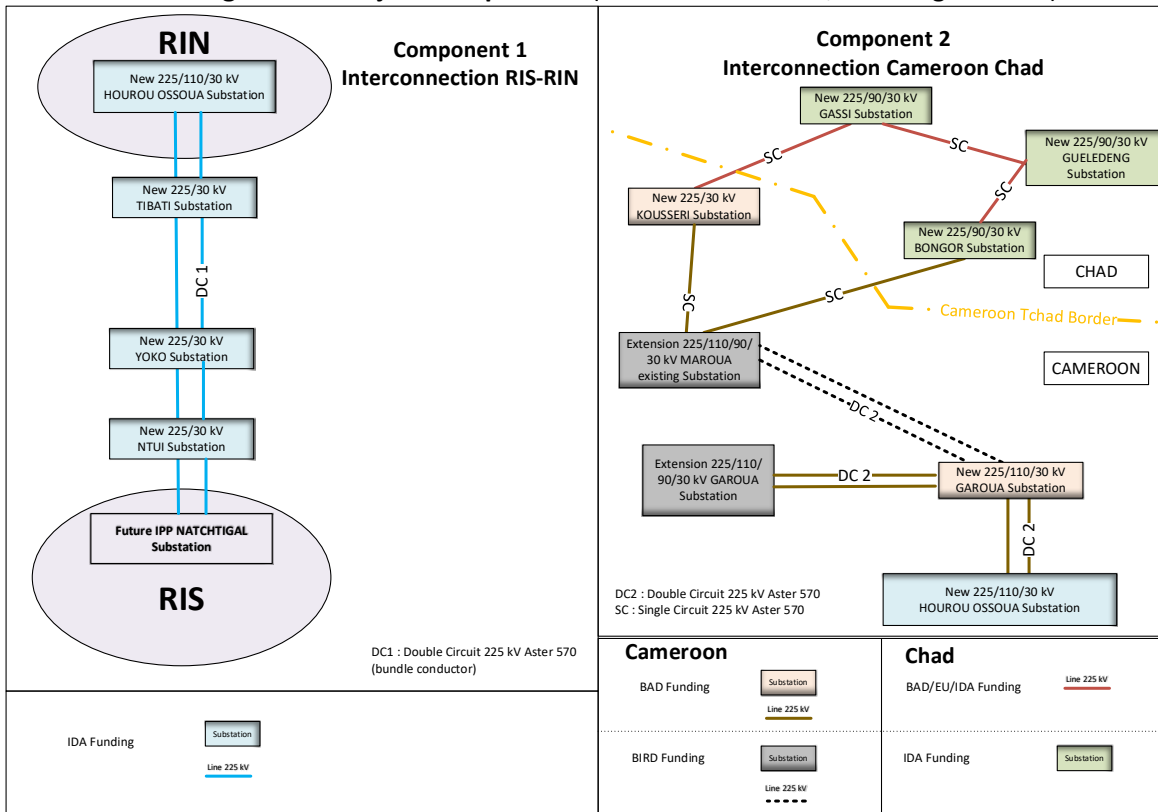


ANNEX 2: Detailed Project Description

COUNTRY: Africa
Cameroon - Chad Power Interconnection Project

1. This Annex provides a detailed description of the transmission infrastructure to be constructed under the Project, including nearly 1,556 km of HV transmission lines (1,318 km in Cameroon and 238 km in Chad) and related substations and compensation equipment (Static Var Compensator), as well as electrification investments in Chad.

Figure 2.1: Project Components (DC = double-circuit; SC = single-circuit)



2. The Project will connect the southern regions of Cameroon, where most of the country’s hydropower potential is located, to the North of the country, through the interconnection of the southern and northern networks (RIS-RIN Interconnection), and beyond to Chad, through the Cameroon–Chad Interconnection. Specifically, the RIS-RIN Interconnection, entirely financed by IDA, will extend from Nachtigal substation, close to the Nachtigal HPP, to the Hourou Oussoua (near Ngaoundere) substation. The cross-border line will extend from Hourou Oussoua in Cameroon to Gassi (N’Djamena) in Chad, through 225 KV lines between Hourou Oussoua – Garoua - Maroua – Kousseri -Bongor - Gueledeng. The part of the line within the Cameroon’s border (until Bongor) is financed by AfDB; the rest (Chad’s section) is co-financed by IDA. In addition, about 478 localities in rural areas along the corridor will be electrified with AfDB financing through the reinforcement and expansion of MV network infrastructure. In Chad, the Project will finance



investments in transmission infrastructure and extension and densification of the distribution network in and around N'Djamena, which are expected to enable 50,000 new connections, doubling the electricity access rate there.

3. **Construction of RIS-RIN interconnection (US\$266 million, all IDA credit).** The construction of the RIS-RIN Interconnection is financed under Sub-component 1.A. The point of departure of the line is at Nachtigal. The line will be connected to the Nachtigal substation via an extension with two-line bays and a 225kV line to Ntui substation located at 9 km from the Nachtigal power station. The interconnection will consist of a 225kV double circuit transmission line extending for 514 km from Nachtigal (RIS) to Hourou Oussoua (RIN connection point), including the four substations of Nachtigal, Yoko, Tibati, and Hourou Oussoua. The Hourou Oussoua substation will be the connection point between the RIS-RIN and Cameroon-Chad interconnection. SONATREL conducted a preliminary feasibility analysis with the support of an international consulting firm (Rapport Avant-Projet Sommaire Interconnexion RIS-RIN; IED; February 2020), which included load flow and dynamic simulations and a technical and economic comparative analysis. On that basis, an optimal corridor and technical parameters for the line and substations have been identified, and project costs estimated. The analysis is continuing towards preparing technical specifications and tender documents. The appraisal of technical specifications identified so far and estimated costs suggests that technologies and equipment used for lines and substations are pretty standard and well tested in the region; they do not pose any unusual construction and operational challenges. Cost estimates (Table 2.1) are deemed to be in line with current market prices and they include a 10 percent contingency to account for cost increases due to the final route alignment; adaptation of final/approved design during construction works mainly for the foundations; and security risks due to the fragile situation in some of the areas traversed by the interconnections.

Figure 2.2: RIS-RIN Interconnection Line Routing

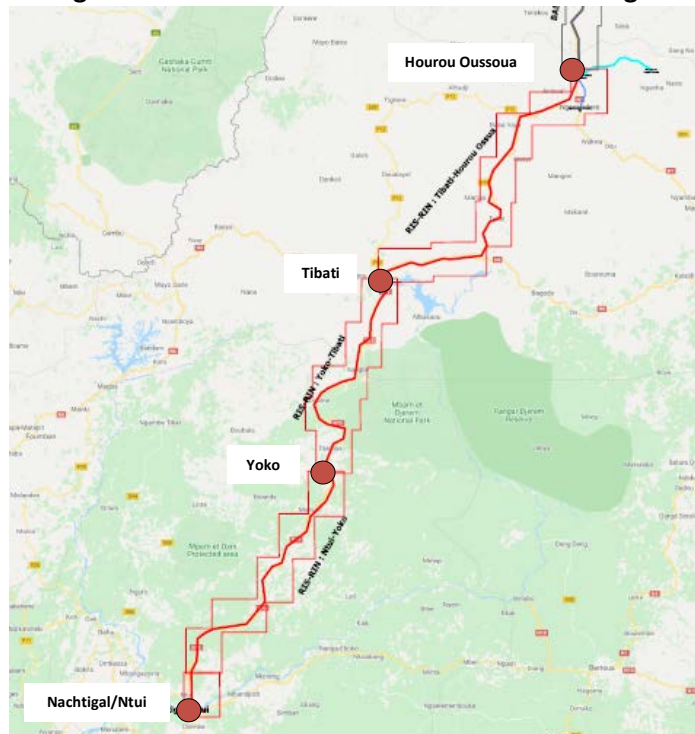




Table 2.1: Infrastructure cost estimates for RIS-RIN interconnection (Sub-component 1.A)

RIS-RIN 225 kV Interconnection	Budget (M\$)
Transmission Lines (Double Circuit/bundle)	178.1
Nachtigal-Ntui-Yoko (180 km)	67.1
Yoko-Tibati (141 km)	48.0
Tibati-Hourou Oussoua (193 km)	63.0
Substations + Compensation Equipment	87.9
Ntui New substation	14.0
Yoko New substation	18.0
Tibati New substation	19.0
Hourou Oussoua New substation	19.0
SVC Yoko	7.8
SVC Tibati	10.1
Total	266.0

4. The 225 kV line (US\$178 million) will be a double-circuit line of vertical configuration with the two circuits equipped and composed of a two-bundle aluminum conductor (Aster 570 mm²). The towers will be equipped with one steel conductor as classical ground wire and one OPGW. The double-circuit towers will be of the lattice type, with conductors arranged in two vertical planes. The choice of the number and type (suspension, angle, and dead end) of tower types will be made on a conventional basis, considering the final line routing approved as result of the detailed studies to be carried out by contractors, but with clear instructions that if found to be economical, they may combine one or more designs into a single type. To reduce voltage and current asymmetry during normal operation, phase transpositions shall be provided. The line will be equipped with an OPGW (48 optical fibers) that will provide electric protection from lightning strikes and allow high-speed transmission of data to control the line, as well as communication. The selected routing Nachtigal -Ntui- Yoko - Tibati - Hourou Oussoua was chosen over 4 other options based on cost, project related risks, environmental and social risks, operational and maintenance risks, and potential to increase electricity access for settlements close to the new transmission line.

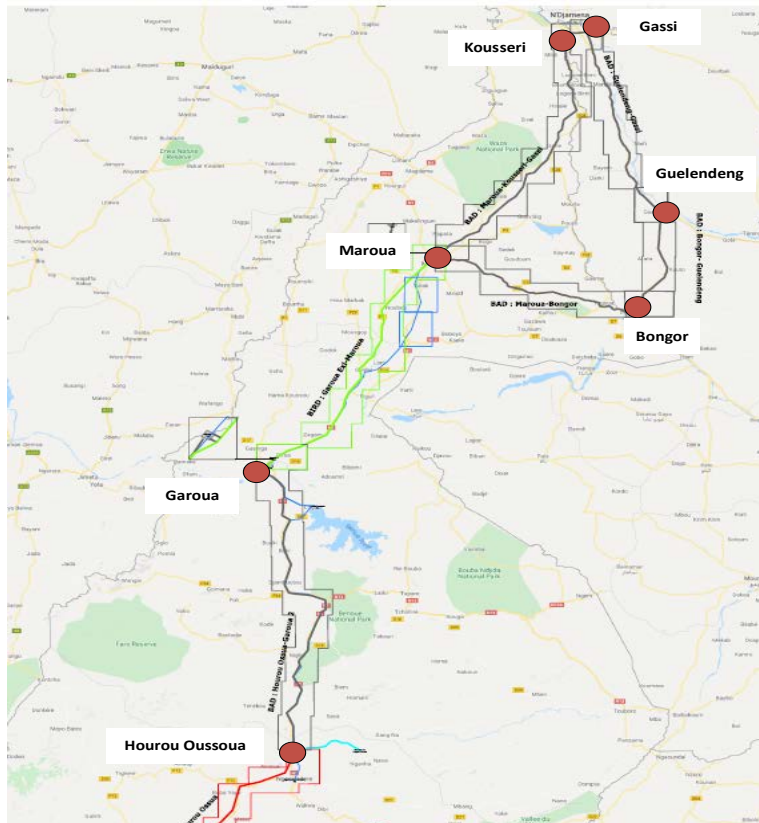
5. The Project will finance the construction of four substations of 225/30 kV (Ntui, Yoko, Tibati, and Hourou Oussoua). The 225 kV substations (US\$70 million) will be of the outdoor open-terminal type, with a control building containing all the auxiliary equipment. The bus bars will be air-insulated tubular aluminum, in a single bus bar, designed for future extension to a double bus bar. The breakers will be insulated with sulfur hexafluoride (SF₆) and mechanically tripped through a motor set spring. Each substation will be controlled by a built-in SCADA, which will enable their selection and control either locally or remotely by a control center. Communication links for the centralized system will be set up either by means of a carrier line or by fiber optic. Investments include the installation of auxiliary supply (battery, uninterruptible power service, diesel generator, MV sub-station, AC/DC supply) or extension, SCADA SCMS and Telecommunication, control building and civil works. The installation of an SCMS in the substations will allow to monitor and control breakers, generators, transformers, surge arrestors, and other devices from an operator desk in the control room of a substation. The SCMS accommodates existing intelligent electronic devices and fully integrates new technologies for control, protection, disturbance recording, and monitoring. Furthermore, it can communicate with higher-level control centers by means of communication protocols, provided that the telecommunication links from each related substation up to the National Dispatch Center.



6. The Project will also finance the required compensation equipment (US\$18 million) to be installed in the two substations Yoko and Tibati along the RIS-RIN interconnection. SVC equipment was identified during the feasibility study for voltage regulation. Other SVC required on the RIN network (Hourou Oussoua, Maroua, Kousseri, Garoua) will be financed by AfDB as part of their financing of the Cameroon-Chad Interconnection funding. The study confirmed that under steady state conditions the voltages remain within 5 percent of their nominal values, available generators remain within 80 to 100 percent of their rated capacity, and current limits are respected. Future dynamic analyses will have to demonstrate grid stability and that the network can restore voltage and frequency in case of short circuit in a substation or outage of a large generator. These studies will also confirm the rated power and range of the different SVCs.

7. **Cameroon-Chad Interconnection (US\$345⁴⁵ million of which AfDB US\$241 million, IDA US\$34 million and World Bank-financed ETRP US\$70 million).** The Cameroon-Chad Interconnection consists of the following key parts: (i) a double-circuit 225-kV HV main transmission line between Hourou Oussoua , Garoua and Maroua; and (ii) two 225 kV single-circuit HV lines with one link between Maroua (Cameroon), Bongor, Guelendeng and Gassi (Chad), and the other between Maroua, Kousseri (Cameroon) and Gassi (Chad) (Figure 2.3).

Figure 2.3: Cameroon-Chad Interconnection Line Routing



⁴⁵ This refers to infrastructure costs only, which explains the difference with the costs indicated in the project description (paragraph 39, main text). The US\$9 million of unallocated amount is not included. Also, the Project will rely on infrastructure to be constructed under ETRP. The related costs are included here only for reference.



8. The power flow simulations have confirmed the validity of the 225 kV voltage level for the interconnection. The network study concluded that the choice of the ASTER 570 mm² conductor will allow for a maximum transit power for export to Chad of 200 MW under normal conditions. The voltage and the power flows remain within the admissible value ranges under the most unfavorable conditions of temperature and load. However, the addition of SVC equipment in Hourou Oussoua, Maroua, Kousseri, Garoua substation is required to provide fast-acting reactive power for voltage transmission regulation on HV RIN network. The N-1 Criterion is met for the entire network by the installation of double 225 kV circuit and second transformer at each 225kV substation. Dynamic simulations have shown the robustness and transient stability of the network until 2035. Power plant projects, in particular hydroelectric power plants from RIS, increase the inertia and the spinning reserves of the interconnected network.

9. The interconnection will also require: (i) construction of four 225 kV substations including Garoua 2, Kousseri in Cameroon and Gueledeng and Bongor in Chad; (ii) extension of four 225 kV substations including Hourou Oussoua, Garoua and Maroua in Cameroon and Gassi in Chad; and (iii) the associated SVC compensation equipment in 4 substations (Hourou Oussoua, Maroua, Kousseri, Garoua) for the voltage regulation along the line. A full feasibility analysis was conducted in 2017 by Hatch-Artelia, including technical specifications and tender documents for the transmission line and substations. The network study was updated for the RIN optimization analysis and a breakdown of investments between funding (AfDB, IDA and ETRP⁴⁶) source was adopted. The investment costs were based on data from similar projects, consultations and most recent offers from recognized manufacturers. Costs include studies, supply, transport, insurance, assembly, civil engineering works for the transmission lines and substations infrastructures. A 10 percent mark-up has been added to compensate for technical contingencies. A US\$9 million unallocated amount is also envisaged to account for contingencies on the Chad side.

10. The 225 kV line between Hourou Oussoua-Garoua 2-Maroua will be a double-circuit line of vertical configuration with the two circuits equipped and composed of one aluminum conductor (Aster 570 mm²). The two 225kV links between Maroua and Gassi will be a single-circuit line of vertical configuration with one circuit equipped and composed of one aluminum conductor (Aster 570 mm²). The towers will be equipped with one steel conductor as classical ground wire and one OPGW for double-circuit and with one OPGW for single-circuit. The OPGW (48 optical fibers) will provide electric protection from lightning strikes and allow high-speed transmission of data to control the line, as well as communication. The towers will be of the lattice type, with conductors arranged in two vertical planes. The choice of the number and type (suspension, angle, and dead end) of tower types will be made on a conventional basis, according to the final line routing approved based on the detailed studies to be carried out by contractors, but with clear instructions that if found to be economical, they may combine one or more designs into a single type. To reduce voltage and current asymmetry during normal operation, phase transpositions shall be provided.

11. The new and extension of 225 kV substations will be of the outdoor open terminal type, including the necessary platforms such as 225, 110 and 90 kV with a control building containing all the auxiliary equipment, associated equipment for protection, metering, communications and SCADA. The design of the stations uses modern equipment (SF₆, minimum maintenance, spring control for circuit breakers, monitoring, digital technologies) and are designed to meet the minimum safety and working distances. The busbars will be of air-insulated aluminum tubular type, arranged in double busbar. The

⁴⁶ IDA funding (US\$70 million) will finance the construction of the 225 kV lines Maroua-Garoua and all the required extension of existing substations to connect all the new 225 kV lines in Garoua and Maroua. This investment is covered by the World Bank-financed ETRP project that, among other things, includes the rehabilitation and strengthening of the congested RIN. The investments on the Garoua-Maroua 225 kV axis and the Garoua, Maroua substations will be used as part of the infrastructure for the Cameroun-Chad Interconnection.



circuit breakers will be insulated with sulfur hexafluoride (SF₆) and mechanically tripped, by motorized spring. Medium-voltage switchboards will be fitted with withdrawable circuit-breakers including measuring reducers. The control of each station will be done via an integrated control-command and data acquisition system (SCADA) which will allow the stations to be selected and controlled either locally or remotely by a future control center. The control-protection and measurement systems are designed in compliance with international standard IEC 61850 on the interoperability of systems via open communications protocols. Optical fiber will be used for communications links for the centralized system.

12. **Access expansion in Chad (US\$33 million⁴⁷, all IDA grant).** Component 3.A will finance infrastructure investments to enhance and expand the electricity grid in N'Djamena and improve SNE's performance. Specifically, financing will be allocated to three main activities: (i) the rehabilitation and expansion of the electricity transmission and distribution assets in N'Djamena, including power lines, substations, and transformers (US\$16 million); (ii) the modernization of the SCADA system, including telecommunication equipment for 47 substations (US\$5 million); and (iii) improvements in SNE's performance comprising supply and installation of about 100,000 smart/pre-paid electricity meters and commercial management and billing systems, as well as technical support to implement these systems (US\$12 million). The OE currently being recruited by SNE under sub-component 3⁴⁸ to support the PIU will, in a first phase, prepare a master plan for N'Djamena network with prioritized investments to improve service quality and extend access, based on which bidding documents will be prepared. In a second phase, the owner engineer will support SNE's PIU with supervision.

13. The HV substations of Gassi and Lamidji will be extended with one 90kV/15kV transformer (25 MVA) and four connections to the MV network to improve quality of service. In addition, the existing MV/LV network will be rehabilitated to decrease technical losses in N'Djamena. The rehabilitation is urgently required as about 20 percent of the MV/LV substations are overloaded. Automatization of the distribution grid and modernization of the distribution load dispatch center will improve security of supply and ensure the long-term sustainability of electrification investments. The distribution dispatch center will be equipped with a new SCADA and dedicated distribution management system (DMS). The Project will also allow for remote control of 47 distribution stations and MV/LV stations by installing remote terminal units (RTUs) and telecommunication equipment in the distribution and MV/LV stations in order to benefit from the functionalities resulting from the SCADA/DMS in the distribution dispatch center (detection of faults, isolation of outages). The distribution network will be extended and densified with the objective to double SNE's clients base in Chad's capital and the upgrade of the dispatching center will improve security of supply.

14. In order to improve SNE operation and commercial performance, the project will finance SNE's acquisition of an ERP software for the management of corporate resources, the roll-out of a GIS for the MV/LV network and client's database. The Project will finance a revenue protection program, with the installation of a data management software and a fully integrated commercial management system, alongside with the deployment of smart/prepaid meters.

⁴⁷ This refers to infrastructure costs only, which explains the difference with paragraph 41 in the main text.

⁴⁸ For which financing has been made available under the project preparation advance to Government of Chad approved in December 2019.



Table 2.2: Estimated cost for Component 3.A

Activities	Costs (US\$ million)
Sub-component 3.A : Access expansion	33.0
<i>Reinforcement, extension and densification of the Network in N'Djamena</i>	16.0
- Gassi and Lamidji HV substations upgrade	3.0
- MV/LV Network reinforcement	1.0
- MV/LV Network extension and densification	11.0
- Preparation of safeguards instruments (ESIA, ESMP and RAP)	0.5
- Gender assessment, information and consumer awareness campaigns	0.5
<i>Modernization of the Dispatching center</i>	5.0
- RTUs and telecommunication equipment in 47 distribution and MV/LV stations	3.0
- SCADA and Distribution Management System	2.0
<i>SNE performance improvement plan</i>	12.0
- ERP, CMS and GIS for MV/LV network and client's database	5.0
- Meters for existing and new clients (100,000 units)	6.0
- Design and supervision SNE's Revenue Protection Program	1.0



ANNEX 3: Demand – Supply Balance Analysis

COUNTRY: Africa

Cameroon - Chad Power Interconnection Project

1. The World Bank has conducted an electricity demand-supply balance analysis for Cameroon and Chad to assess the feasibility of power trade between the two countries. Electricity demand and supply assumptions in two cases, one "with project" and the other "without project", are presented below and thereafter a demand-supply analysis in a base case scenario, assuming imports of firm electricity to Chad to be equal to 50 MW in 2028 and increasing up to 100 MW as from 2030, as well as additional sensitivity analyses.

A. Base Demand Assumptions

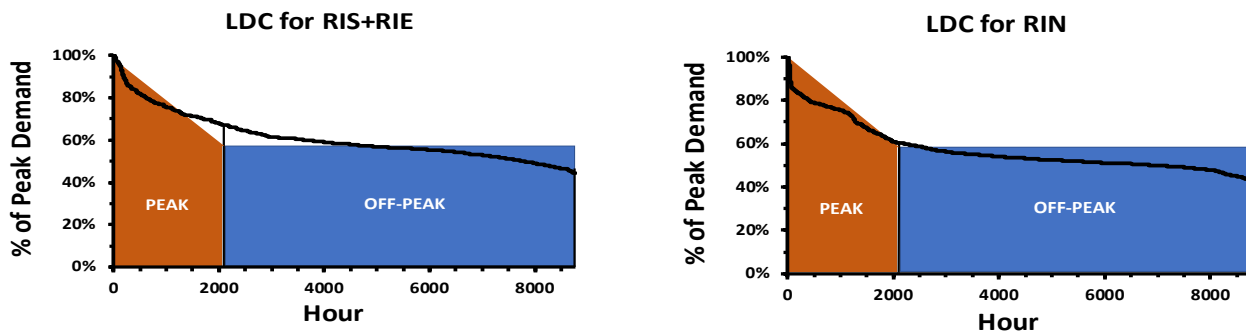
Cameroon

CASE A: Without Project

2. Electricity demand for Cameroon’s grid has been estimated by considering each of the country’s power systems. Specifically, peak demand projections for the RIN (Table 3.1) are based on the high-growth scenario of PDSE of June 2014 and were validated by SONATREL. The forecasts for the RIS + RIE connected system are derived from the medium-growth scenario of PDSE, since the economic growth assumptions used there (real GDP growth of 6 percent per annum) are closest to the expected long-term growth predicted by the IMF (~5 percent). Table 3.1 presents peak demand and energy requirements projections in the absence of the Project up to 2035.

3. To determine the required energy and the demand – supply balance for Cameroon’s grid, the fractional load duration curve (as a fraction of peak load) for the combined RIS+RIE systems and the RIN was split into two load blocks (Figure 3.1): a peak load block covering 25 percent of the year (2,190 hours per year) and an off-peak load block covering 75 percent of the year (6,570 hours per year). The demand – supply balance was solved for each part of the load duration curve in both the RIS+RIE and RIN systems under the assumption of an economic dispatch with the following merit order of plants: 1) hydropower plants; 2) gas-based plants; 3) HFO/LFO generators; and 4) diesel gensets.

Figure 3.1: Load duration curve for the combined system of RIS+RIE (left) and RIN (right)



Source: PDSE, 2014.

Note: Energy in the peak period is approximated by the orange trapezoid, energy in the off-peak period by the blue rectangle.



Table 3.1: Peak demand and total energy required projections for RIS+RIE and RIN (2020 to 2035) for “without project” scenario

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Peak Demand RIN (MW)	93	101	110	120	131	143	156	170	185	201	237	258	281	307	334	376
Peak Demand RIS + RIE (MW)	1535	1634	1708	1781	1859	1940	2035	2131	2234	2343	2462	2561	2660	2764	2874	2988
Energy Required RIN (GWh)	471	513	560	610	665	725	790	861	938	1023	1203	1311	1429	1558	1698	1909
Energy Required RIS + RIE (GWh)	8194	8724	9121	9511	9925	10359	10866	11381	11927	12513	13147	13677	14204	14759	15346	15957

Source: Rapport Avant-Projet Sommaire Interconnexion RIS-RIN ; IED ; February 2020

4. Self-generation with diesel generators from rural settlements that will be electrified by the Project is estimated from the AfdB study for the Cameroon-Chad interconnector.⁴⁹ This analysis starts from the 2016 demand reported in the AfdB study⁵⁰ and assumes the demand of the rural settlements grows at the average population growth rate in Cameroon (2.2 percent).⁵¹ Table 3.2 reports the projected energy requirements for the rural settlements in Northern Cameroon in the “without project” scenario up to 2035.

Table 3.2: Self-generation from rural settlements in Northern Cameroon (2020 to 2035) for “without project” scenario

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Energy (GWh)	2.2	2.3	2.3	2.4	2.4	2.5	2.5	2.6	2.7	2.7	2.8	2.8	2.9	3.0	3.0	3.1

Source: Étude du projet d'interconnexion des réseaux électriques du Cameroun et du Tchad, Electrification Rurale; Hatch-Artelia; May 2017

⁴⁹ Étude du projet d'interconnexion des réseaux électriques du Cameroun et du Tchad, Electrification Rurale; Hatch-Artelia; May 2017.

⁵⁰ This is the last year for which the AfdB reports historic demand for the rural settlements in Northern Cameroon.

⁵¹ Average population growth rate for the next 15 years reported in Cameroon’s PDSE.



CASE B: With Project

5. Electricity demand in the RIS remains the same with or without the Project. For the RIN, the electrification of rural communities in Northern Cameroon along the cross-border interconnection that will result from the Project is expected to increase energy requirements to some extent (Table 3.3). The demand-supply balance for Cameroon’s grid is then solved for the combined system of (RIS+RIE) and RIN, including the demand from the electrified communities in Northern Cameroon as from 2028 and the firm export requirement to Chad (from 50 MW in 2028 to 100 MW in 2030 and afterwards), using the combined load duration curve of (RIS+RIE) and RIN with the same merit order as for the “without Project” scenario.

Table 3.3: Grid energy requirements in Cameroon “with Project”

	2028	2029	2030	2031	2032	2033	2034	2035
Additional Energy Required for RIN (GWh)	11	11	12	13	14	14	15	16
Total Energy Required for (RIS+RIE) and RIN (GWh)	12,876	13,546	14,362	15,000	15,646	16,330	17,059	17,881

Source: *Étude du projet d’interconnexion des réseaux électriques du Cameroun et du Tchad, Electrification Rurale; Hatch-Artelia; May 2017*

Note: The interconnector will be operational as from 2028 in the base case scenario.

Chad

CASE A: Without Project

6. Grid electricity consumption projections for Chad have been made based on a methodology similar to the one detailed in the Hatch-Artelia feasibility study for the AfDB-financed Cameroon - Chad interconnector.⁵² The total electricity consumption consists of the sum of total end-use consumption and technical losses. Technical losses are assumed to remain fixed at 12 percent;⁵³ total consumption is the sum of three brackets:

- Residential consumption calculated as:

$$\frac{\text{Population} \times \text{Grid Access Level} \times \text{Consumption per Household}}{(\text{People per Household})}$$

Note: Historic data and projections of Chad’s population are derived from the UN World Population Prospects 2019.⁵⁴ The number of people per household is derived from the Hatch-Artelia study. Grid access in 2017 has been estimated based on SNE’s total number of domestic clients in 2017. Total residential consumption and consumption per household are derived from the 2017 SNE Activity Report. The analysis assumes the same electricity access growth rate as the low-growth scenario in the Hatch Artelia report (1.9 percent growth in access level per year).

- Commercial consumption from businesses is estimated as a fixed fraction of residential consumption as taken from the Hatch-Artelia study
- Industrial consumption from large industrial projects is taken from the Hatch-Artelia study

7. The peak demand is calculated from the energy requirement using a fixed load factor of 69 percent.⁵⁵

⁵² Étude du projet d’interconnexion des réseaux électriques du Cameroun et du Tchad - Rapport Étude d’Avant-Projet Sommaire (version finale), June 2017.

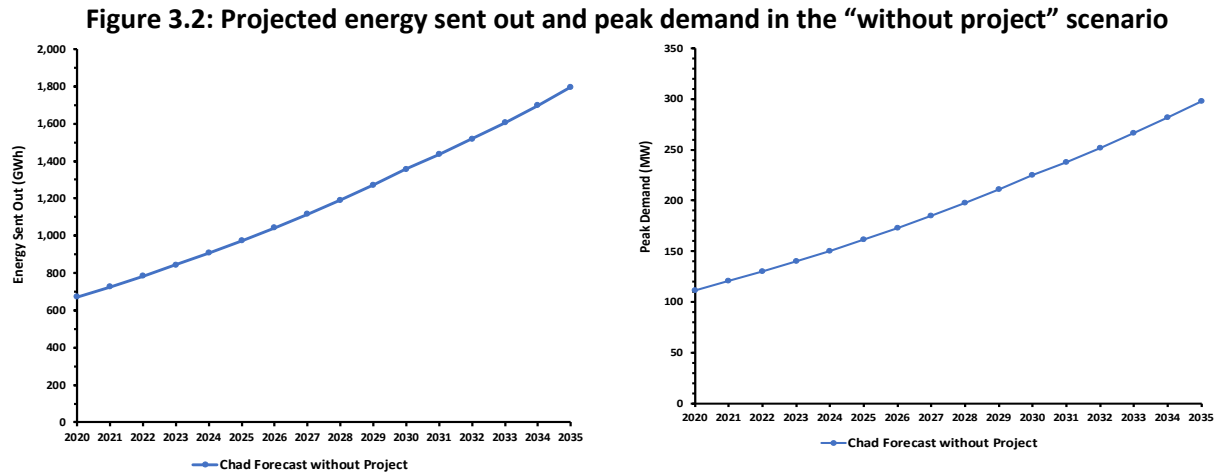
⁵³ World Bank Power Sector Note for the Republic of Chad, June 2018.

⁵⁴ <https://population.un.org/>

⁵⁵ This is the load factor of 2017.



8. In the absence of the Project, energy needs are estimated to grow from 672 GWh to 1,797 GWh, and peak demand from 111 MW to 298 MW during the period 2020-2035 (Figure 3.2). The demand-supply for Chad’s grid is solved following the same methodology as for Cameroon using the fractional load duration for Chad of 2017 and the following merit order of plants under economic dispatch: 1) solar plants; 2) HFO plants; 3) plants using a fuel mix of HFO/Diesel; and 4) Diesel generators.



Source: Étude du projet d’interconnexion des réseaux électriques du Cameroun et du Tchad, Electrification Rurale; Hatch-Artelia; May 2017

9. Self-generation with diesel generators from rural settlements in Chad that will be electrified by the Project is estimated from the AfDB study for the Cameroon-Chad interconnector.⁵⁶ This analysis starts from the 2016 demand reported in the AfDB study⁵⁷ and assumes the demand of the rural settlements grows at the average population growth rate in Chad of 2.6 percent⁵⁸. Table 3.4 reports the projected energy requirements for the rural settlements in Chad in the “without Project” scenario up to 2035.

CASE B: With Project

10. Energy consumption forecasts in the “with project” scenario have been made for three distinct periods:
- 2020-2022, when Project is in preparation and conditions are the same as for the “without project” scenario;
 - 2023-2027, when estimates are slightly above the “without project” forecasts due to the electrification of 1/3 (16.7k connections) of the new connections delivered by the project. Even though technical losses will reduce from 12 to 8 percent (due to grid rehabilitation in N’Djamena) in this period, the forecast assumes there will be more than enough demand to absorb the additional available energy for consumption resulting from loss reduction;
 - 2028-2030, which is characterized by a step increase due to two reasons: a) the electrification of the remaining 2/3 (33.3k connections) new connections deployed by the project in N’Djamena; and b) the connection of rural settlements along the Cameroon – Chad interconnector; and

⁵⁶ Étude du projet d’interconnexion des réseaux électriques du Cameroun et du Tchad, Electrification Rurale; Hatch-Artelia; May 2017.

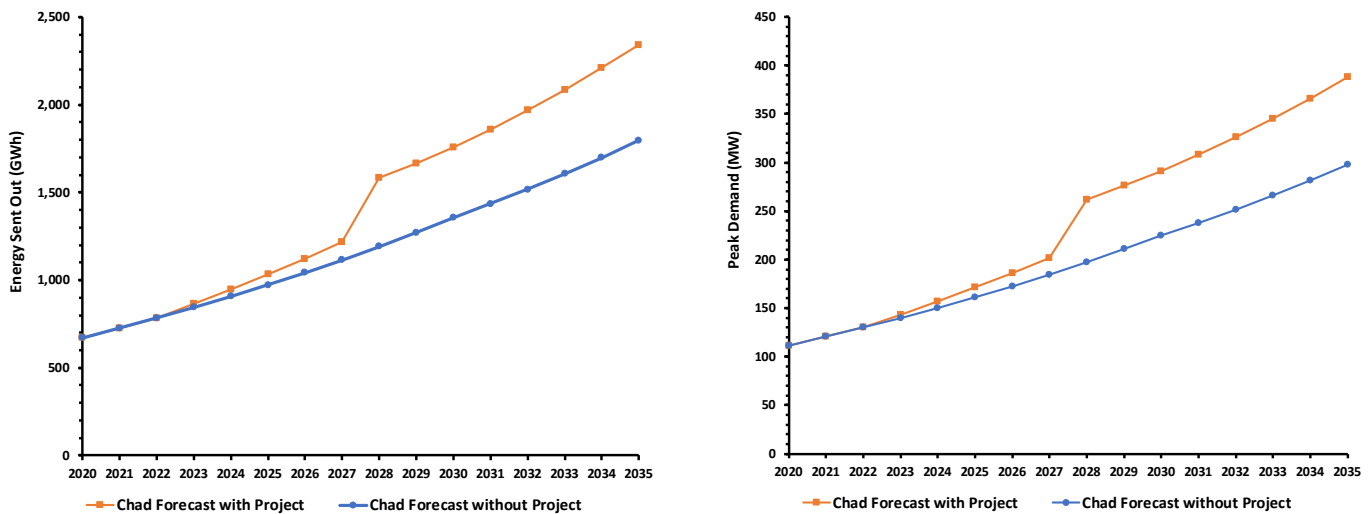
⁵⁷ This is the last year for which the AfDB reports historic demand for the rural settlements in Chad.

⁵⁸ Average population growth rate in Chad for the next 25 years as per the UN World Population Prospects 2019.



- 2029-2035, when the growth rate in connections stabilizes around the same level as in the “without project” scenario.
11. The methodology used is the same as in the “without project” scenario, with the following variations:
- Technical losses are reduced from 12 to 8 percent over the period from 2023 to 2027;
 - Residential consumption is significantly higher as the Project is expected to double the access rate in N’Djamena, adding 50,000 connections between 2023 and 2027.⁵⁹ After 2028, the analysis assumes the same growth in connections as the “without project” scenario; and
 - Rural electrification in Chad will cause a small increase in energy need starting from 16 GWh in 2028 up to 24 GWh in 2035.
12. Total energy sent out will increase more than threefold, from 672 GWh in 2020 to 2,340 GWh in 2035 (Figure 3.3) in the “with project” scenario or a 32 percent increase in the “with project” versus the “without project” scenario by 2035. During the same period, peak demand is expected to increase from 111 MW in 2020 to 388 MW in 2035.

Figure 3.3: Projected energy sent out and peak demand for the “with” and “without project” scenarios



Source: Étude du projet d'interconnexion des réseaux électriques du Cameroun et du Tchad, Electrification Rurale; Hatch-Artelia; May 2017

13. The demand-supply balance for Chad’s grid is solved with the inclusion of the demand from the electrified communities along the Cameroon-Chad interconnector and imports from Cameroon as from 2028 using the following merit order: 1) solar plants; 2) Imports ;3) HFO plants; 4) Plants using a fuel mix of HFO/Diesel; and 5) Diesel generators.

⁵⁹ The forecast assumes that 2/3 (33.3k connections) of the new connections are only electrified in 2028.



Table 3.4: Self-generation from rural settlements in Chad (2020 to 2035) for “without project” scenario

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Energy (GWh)	3.2	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.7

Source: Étude du projet d'interconnexion des réseaux électriques du Cameroun et du Tchad, Electrification Rurale; Hatch-Artelia; May 2017



B. Supply Assumptions

Cameroon

14. Existing and future power generation capacity in Cameroon is presented in detail in Table 3.5, which lists power plants, their expected capacity, starting year of operation for future plants (CoD), and possible retirement year of existing plants up to 2035. The list has been validated by MINEE, SONATREL and ENEO.

15. The analysis is made for a “base case” scenario, which assumes the commissioning of all plants already under construction, the commissioned 350 MW gas plant in Limbe to become operational starting from 2025, and the construction of one additional large HPP along the Sanaga river (Grand Eweng – 700 MW by 2028).

Table 3.5: Generation capacity in Cameroon (2020-2035; base case)

Power Plant	Region	Fuel Type	Status	Capacity (MW)	CoD	Retirement Year
<i>Songloulou</i>	RIS-Douala	Hydro	Existing	384		
<i>EDEA</i>	RIS-Douala	Hydro	Existing	270		
<i>Logbaba</i>	RIS-Douala	Gas	Existing	12		
<i>Kribi</i>	RIS-Douala	Gas	Existing	180		
<i>Dibamba</i>	RIS-Douala	HFO	Existing	84		2029
<i>Limbe</i>	RIS-Douala	HFO	Existing	80		2025
<i>Altaaqa</i>	RIS-Yaounde	LFO	Existing	30	-	2021
<i>Ahala</i>	RIS-Yaounde	LFO	Existing	40	-	2024
<i>Mbalmayo</i>	RIS-Yaounde	LFO	Existing	10	-	2025
<i>Oyomabang 1</i>	RIS-Yaounde	HFO	Existing	18	-	2025
<i>Ebolowa</i>	RIS-Yaounde	LFO	Existing	10	-	2025
<i>Bafoussam</i>	RIS-Bafoussam	LFO	Existing	3	2025	
<i>Bamenda</i>	RIS-Bafoussam	LFO	Existing	20	2025	
<i>Lagdo</i>	RIN	Hydro	Existing	75		
<i>Memvele</i>	RIS-Yaounde	Hydro	Constructed	180	2021	
<i>Nachtigal</i>	RIS-Yaounde	Hydro	Under Construction	120 MW (2020)/420 MW as from 2024	2023	-
<i>Bekoko</i>	RIS-Douala	Gas	Under construction	150	2021	
<i>Limbe-Gas</i>	RIS-Douala	Gas	Committed	350	2025	
<i>Grand Eweng</i>	RIS-Douala	Hydro	Planned	135 MW (2027)/700 MW as from 2028		
<i>Lom Pangar</i>	RIE	Hydro	Under construction	30	2023	
<i>Bini Warak</i>	RIN	Hydro	Under construction	72	2025	

Source: Rapport Avant-Projet Sommaire Interconnexion RIS-RIN ; IED ; February 2020

Note : Thermal plants are assumed to be available for 90 percent of the time, capacity factors for hydroplants are based on the Rapport Avant-Projet Sommaire Interconnexion RIS-RIN of IED.

16. The GoC plans to retire all HFO/LFO plants by 2025 except for the Dibamba plant, whose take-or-pay contract will expire only in 2029.

**Chad**

17. In Chad, power generation capacity is entirely thermal, based on diesel- or HFO-fueled plants (Table 3.6). This includes 71 MW owned by SNE and 46 MW from IPPs, all located around N'Djamena. Electricity consumption is also concentrated in the capital city, which accounted for 95 percent of national consumption in 2017. Chad's future generation park will probably include a mix of solar and thermal plants based on SNE's Development Plan 2017-2021. The study considers new solar PV and HFO plants, and the reconversion of existing diesel plants to HFO/diesel as future generation options (Table 3.7).

Table 3.6: Existing generators in Chad⁶⁰

Power Plant	Contractual Arrangement	Fuel Type	Available Capacity (MW) ⁶¹	Cost of Generation (US\$/MWh)
Farcha 1	Public (SNE)	Diesel	7	215
Farcha 2	Public (SNE)	Diesel	60	215
N'Djamena: MBH	Public (SNE)	Diesel	4	215
VPower	IPP	Diesel	16	218
Aggreko	IPP	HFO	20	192
NRC (Refinery)	IPP	Diesel	10	252

Table 3.7: Future Generation options in Chad⁶²

Power Plant ⁶³	Fuel Type	Available Capacity (MW)	CoD	CAPEX (US\$ million/MW)	Fuel Cost (US\$/liter)
Reconversion of Farcha 1 to HFO/Diesel	HFO/Diesel	7	2022	-	0.54
Reconversion of Farcha 2 to HFO/Diesel	HFO/Diesel	60	2022	-	0.54
Reconversion of N'Djamena-MBH to HFO/Diesel	HFO/Diesel	4	2022	-	0.54
Reconversion of VPower to HFO/Diesel	HFO/Diesel	16	2022	-	0.54
Reconversion of NRC (Refinery) to HFO/Diesel	HFO/Diesel	12	2022	-	0.54
Aggreko	HFO	20	Existing	-	0.497
Djermaya	HFO	20	2025	1.8	0.497
Farcha3	HFO	90	2023	1.61	0.497

⁶⁰ Source : Le Secteur de l'Énergie au Tchad – Pistes de Solutions pour une Électricité Disponible et Accessible, Technidev, Octobre 2019 / SNE Activity Report – 2017 / World Bank Power Sector Note for the Republic of Chad, June 2018.

⁶¹ Existing plants are assumed to be available for 95% of the time.

⁶² List of plants and CAPEX for HFO plants based on SNE's Development Plan 2017-2021. Other cost estimates are from EIA or collected by World Bank staff. Future HFO plants are assumed to be available for 90% of the time. Solar plants have a maximum capacity factor of 20% (based on the Global Solar Atlas - <https://globalsolaratlas.info>).

⁶³ The reconversion of the diesel plants is assumed to be possible at negligible cost. After conversion, the plants will run on a mixture of 80% HFO and 20% diesel.



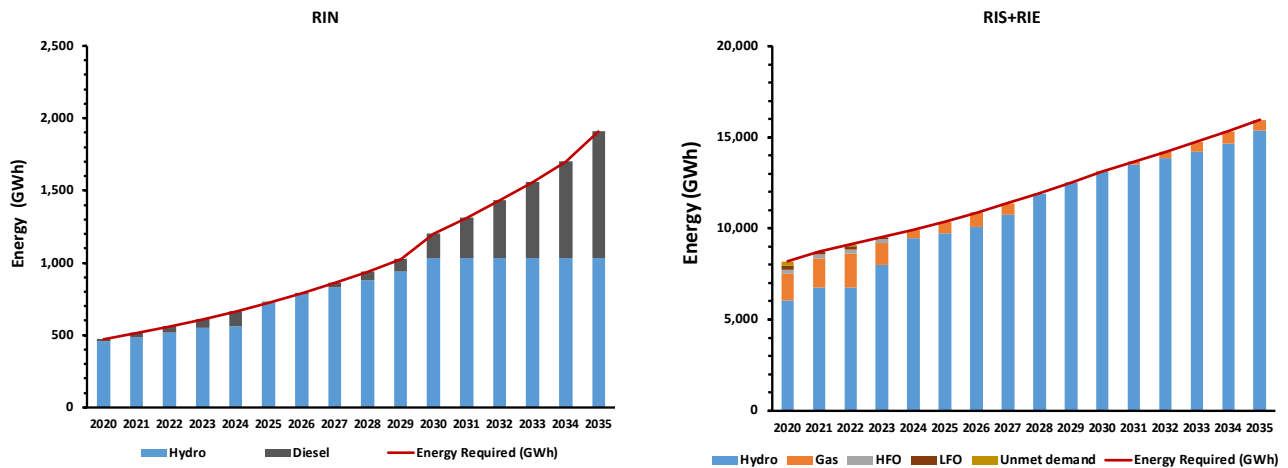
ANIMER N'Djamena	HFO	30	2025	1.8	0.497
Abeche	HFO	10	2025	1.8	0.497
Sarr	HFO	5	2025	1.8	0.497
PV N'Djamena	Solar	30	2025	1.2	-
PV Abeche	Solar	5	2025	1.2	-
PV Sarh	Solar	5	2025	1.2	-
Generic_PV	Solar	40	2030	1.2	-
Generic_HFO	HFO	100	2030	1.8	0.497
Generic_PV_2031	Solar	25	2031	1.2	-
Generic_PV_2032	Solar	30	2032	1.2	-
Generic_PV_2033	Solar	35	2033	1.2	-
Generic_PV_2034	Solar	40	2034	1.2	-
Generic_PV_2035	Solar	40	2034	1.2	-

C. Demand-Supply Analysis

Base Case

18. With the deployment of several large hydro projects and the construction of the Limbe gas power plant, the interconnected RIS+RIE power system in Cameroon has not only enough generation potential to meet demand in Southern Cameroon (Figure 3.4) after 2027 but also excess energy to supply the Northern system (RIN) in Northern Cameroon (Table 3.8). The hydropower supply in the RIN is consistently below or just enough to cover demand, requiring the use of expensive emergency diesel generators, especially after 2029 (Figure 3.4). Therefore, the construction of the RIS-RIN Interconnection would allow transfer of excess supply from the RIS+RIE to the RIN (Figure 3.5), including significant hydropower from 2028 onwards, thus reducing the North's dependency on expensive emergency diesel generation.

Figure 3.4: Energy balance for RIN (left); Energy balance for RIS+RIE (right) in the base case (“without Project” scenario) for 2020-2035.



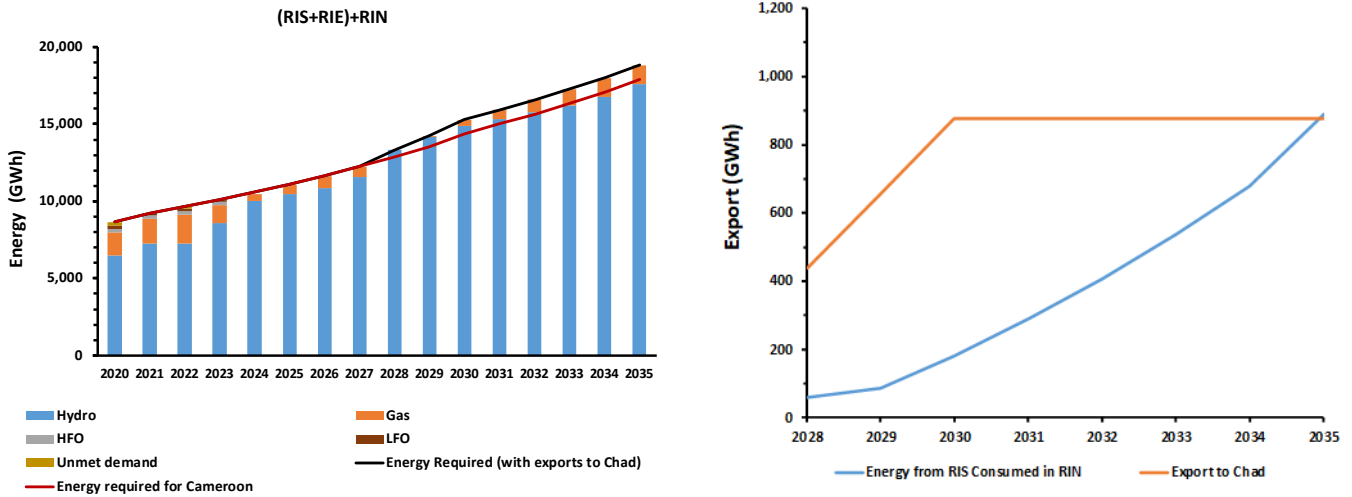
Source: Rapport Avant-Projet Sommaire Interconnexion RIS-RIN ; IED ; February 20220

19. Cameroon will have excess supply exportable to Chad after meeting domestic needs in the South and the North (Figure 3.5 and Table 3.9). Excess supply would stem mostly from hydropower plants, complemented as needed by gas



fueled plants. Assuming, in the base case scenario, that 50 MW of interconnector capacity is used as from 2028 and 100 MW as from 2030, electricity imports will allow Chad to save 438 GWh of HFO/diesel-based supply in 2028 and 876 GWh every year as from 2030 (Table 3.10 and Figure 3.6).

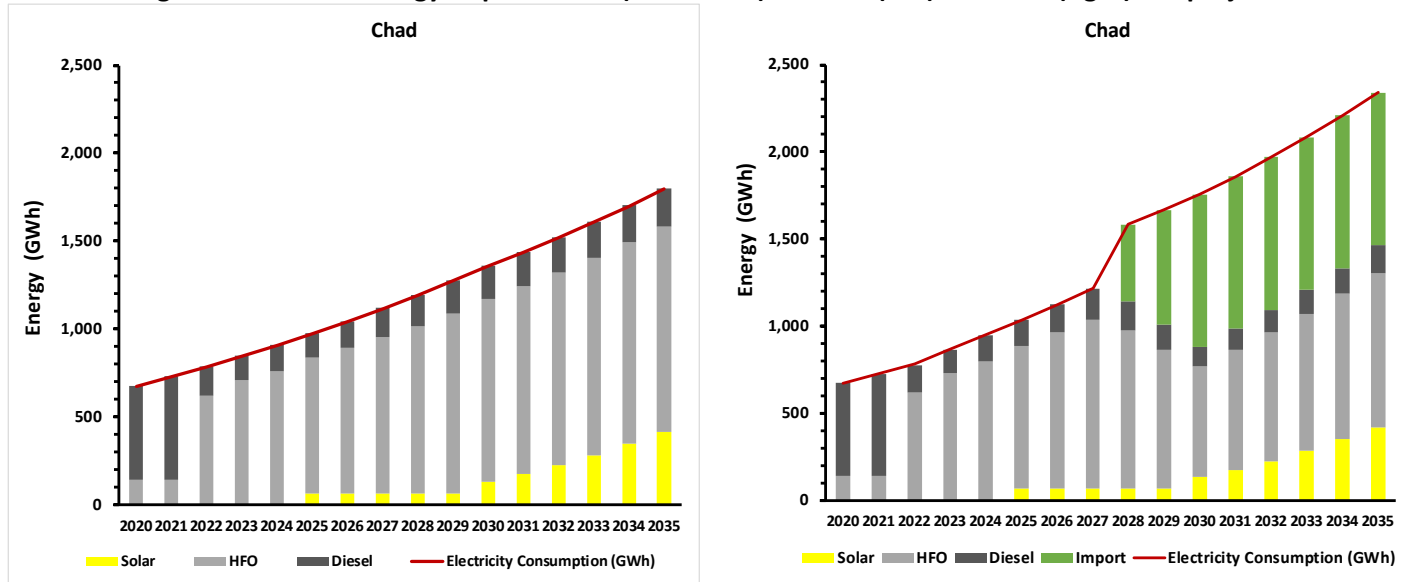
Figure 3.5: Base case energy balance (2020-2035) for (RIS+RIE) + RIN in the “with project” scenario (left) and export flows (right)



Source : Rapport Avant-Projet Sommaire Interconnexion RIS-RIN ; IED ; February 2020

Note: Total export from RIS to RIN is the sum of the exports to meet domestic demand in RIN and the exports to Chad.

Figure 3.6: Chad’s energy requirements (2020-2035) without (left) and with (right) the project



Source: Étude du projet d’interconnexion des réseaux électriques du Cameroun et du Tchad ; Hatch-Artelia; June 2017

Note: The “with project” scenario (right) assumes a conservative import figure of 50 MW (438 GWh/year) for Chad in 2028 and 100 MW (876 GWh/year) as from 2030.



Table 3.8: Base case energy demand -supply balance for Cameroon’s grid (“without project”)

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
WITHOUT PROJECT																
Demand																
<i>A. RIS + RIE</i>																
Peak Load (MW)	1,535	1,634	1,708	1,781	1,859	1,940	2,035	2,131	2,234	2,343	2,462	2,561	2,660	2,764	2,874	2,988
Energy (GWh)	8,194	8,724	9,121	9,511	9,925	10,359	10,866	11,381	11,927	12,513	13,147	13,677	14,204	14,759	15,346	15,957
<i>B. RIN</i>																
Peak Load (MW)	93	101	110	120	131	143	156	170	185	201	237	258	281	307	334	376
Energy (GWh)	471	513	560	610	665	725	790	861	938	1,023	1,203	1,311	1,429	1,558	1,698	1,909
Supply																
<i>A. RIS + RIE</i>																
Capacity (MW)	1221	1441	1441	1591	1841	2060	2060	2195	2760	2760	2676	2676	2676	2676	2676	2676
Generation (GWh)	7,972	8,724	9,025	9,511	9,925	10,359	10,866	11,381	11,927	12,513	13,147	13,677	14,204	14,759	15,346	15,957
Hydro	6,033	6,771	6,771	8,019	9,451	9,750	10,098	10,734	11,927	12,513	13,126	13,490	13,853	14,235	14,639	15,372
Gas	1,490	1,591	1,865	1,197	474	609	767	647	-	-	22	187	351	524	707	585
HFO/LFO	449	362	390	295												
Unmet demand	222		96													
Consumption (GWh)	6,625	7,250	7,500	7,904	8,248	8,609	9,029	9,458	9,912	10,398	10,926	11,365	11,804	12,265	12,753	13,260
Losses (GWh)	1,347	1,474	1,525	1,607	1,677	1,751	1,836	1,923	2,016	2,115	2,222	2,311	2,401	2,494	2,594	2,697
Max. Prod. (GWh)	9,343	11,027	11,027	12,275	14,377	16,104	16,104	17,227	21,929	21,929	21,797	21,797	21,797	21,797	21,797	23,045
Excess Potential (GWh)*	1,148	2,303	1,905	2,763	4,452	5,744	5,238	5,846	10,002	9,417	8,649	8,120	7,593	7,038	6,450	7,088
<i>B. RIN</i>																
Hydro Cap. (MW)	75	75	75	75	75	147	147	147	147	147	147	147	147	147	147	147
Generation (GWh)	471	513	560	610	665	725	790	861	938	1023	1203	1311	1429	1558	1698	1909
Hydro (GWh)	457	485	517	550	559	725	782	830	882	939	1,035	1,035	1,035	1,035	1,035	1,035
Diesel (GWh)	14	28	43	60	105	0	8	31	57	84	168	276	394	523	663	875
Consumption (GWh)	401	438	477	520	567	618	673	734	800	872	1,025	1,118	1,218	1,328	1,447	1,628
Losses (GWh)	69	76	83	90	98	107	117	127	138	151	177	193	211	230	250	282

*Note: The excess potential is the difference between the maximum output and the energy requirement in the RIS. Total maximum available energy for export to RIN will be the excess potential minus losses of the RIS-RIN interconnection. The maximum export potential to Chad will be the excess potential minus losses of the RIS-RIN interconnection, domestic import needs for RIN to displace diesel generation in RIN, and losses of the Cameroon – Chad interconnection.



Table 3.9: Base case energy demand -supply balance for Cameroon-Chad interconnected grid (“with project”)

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
WITH PROJECT																
Demand																
CAMEROON																
<i>(RIS + RIE) + RIN</i>																
Peak Load (MW)	1,628	1,736	1820	1,903	1,991	2,084	2,192	2,303	2,420	2,547	2,701	2,822	2,944	3,073	3,211	3,367
Energy (GWh)	8,665	9,237	9,681	10,121	10,590	11,084	11,656	12,242	12,876	13,546	14,362	15,000	15,646	16,330	17,059	17,881
(RIS+RIE)	8,194	8,724	9,121	9,511	9,925	10,359	10,866	11,381	11,927	12,513	13,147	13,677	14,204	14,759	15,346	15,957
RIN	471	513	560	610	665	725	790	861	949	1,034	1,214	1,323	1,442	1,571	1,712	1,924
Rural electrification									11	11	12	13	14	14	15	16
CHAD																
Peak Load (MW)	112	121	130	144	158	172	187	202	262	276	291	308	326	346	366	388
Energy (GWh)	672	727	784	865	948	1034	1123	1215	1582	1667	1756	1859	1969	2085	2209	2340
Rural electrification									16	17	18	20	21	22	23	24
Supply																
CAMEROON																
<i>(RIS + RIE)</i>																
Capacity (MW)	1,221	1,441	1,441	1,591	1,841	2,060	2,060	2,195	2,760	2,760	2,676	2,676	2,676	2,676	2,676	2,676
Generation (GWh)	7,972	8,724	9,025	9,511	9,925	10,359	10,866	11,381	12,449	13,294	14,254	14,894	15,544	16,231	16,963	17,791
Hydro	6,033	6,771	6,771	8,019	9,451	9,750	10,098	10,734	12,449	13,207	13,851	14,290	14,735	15,206	15,708	16,586
Gas	1,490	1,591	1,865	1,197	474	609	767	647	0	87	403	604	809	1,025	1,256	1,205
HFO/LFO	449	362	390	295												
Unmet demand	222		96													
Consumption (GWh)	6,625	7,250	7,500	7,904	8,248	8,609	9,029	9,458	9,912	10,398	10,926	11,365	11,804	12,265	12,753	13,260
Losses (GWh)	1,347	1,474	1,525	1,607	1,677	1,751	1,836	1,923	2,016	2,115	2,222	2,311	2,401	2,494	2,594	2,697
Balance for RIS-RIN (GWh)									522	781	1,106	1,218	1,340	1,472	1,617	1,834
(RIS-RIN connection)																
Losses (GWh)									13	20	28	31	34	37	41	46
Export to RIN (GWh)									509	762	1,078	1,187	1,306	1,435	1,576	1,788
RIN																
Hydro Cap. (MW)	75	75	75	75	75	147	147	147	147	147	147	147	147	147	147	147
RIN Generation (GWh)	471	513	560	610	665	725	790	861	889	946	1,035	1,035	1,035	1,035	1,035	1,035
Hydro (GWh)	457	485	517	550	559	725	782	830	889	946	1,035	1,035	1,035	1,035	1,035	1,035
Diesel (GWh)	14	28	43	60	105	0	8	31								
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Import RIS for local									60	88	180	289	407	537	678	890



demand (GWh)																
Consumption (GWh)	401	438	477	520	567	618	673	734	809	881	1,035	1,128	1,229	1,340	1,460	1,640
Losses (GWh)	69	76	83	90	98	107	117	127	140	152	179	195	213	232	253	284
Balance Cam.-Chad connection (GWh)									449	674	899	899	899	899	899	899
Cam.-Chad Connection																
Losses (GWh)									11	17	23	23	23	23	23	23
Import to Chad(GWh)									438	657	876	876	876	876	876	876
CHAD																
Capacity (MW)	119	119	119	209	209	314	314	314	364	389	554	579	609	644	684	724
Generation (GWh)	672	727	784	865	948	1,034	1,123	1,215	1,144	1,010	880	983	1,093	1,209	1,333	1,464
Solar						67	67	67	67	67	133	175	225	283	350	416
HFO	141	141	191	634	651	800	856	915	847	751	635	687	738	787	832	859
Diesel	531	585	593	230	297	168	200	234	230	193	112	121	130	139	151	189
Import									438	657	876	876	876	876	876	876
Consumption (GWh)	592	640	680	767	847	931	1,018	1,110	1,455	1,534	1,616	1,711	1,811	1,918	2,032	2,153
Losses (GWh)	81	87	93	98	101	103	105	105	127	133	140	149	158	167	177	187

Source: Rapport Avant-Projet Sommaire Interconnexion RIS-RIN ; IED ; February 2020. Étude du projet d'interconnexion des réseaux électriques du Cameroun et du Tchad, Electrification Rurale; Hatch-Artelia; May 2017 ; Le Secteur de l'énergie au Tchad – Pistes de Solutions pour une Electricité Disponible et Accessible, Technidev, Octobre 2019 ; SNE Activity Report – 2017 ;/ World Bank Power Sector Note for the Republic of Chad, June 2018

Note: The base case assumes firm imports of 50 MW (438 GWh/year) to Chad from 2028 and 100 MW (876 GWh/year) from 2030. The loss percentage (~3 percent) for the RIS-RIN interconnection is based on the Rapport Avant-Projet Sommaire Interconnexion RIS-RIN of IED. This analysis assumes the same loss percentage for the Cameroon-Chad interconnection.

Table 3.10: Base case energy demand -supply balance for Chad’s grid (“without project”)

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
WITHOUT PROJECT																
Demand																
Peak Load (MW)	111	120	130	140	150	161	173	185	197	211	225	238	252	266	282	298
Energy (GWh)	672	727	784	844	907	973	1,042	1,115	1,192	1,272	1,356	1,435	1,518	1,606	1,699	1,797
Supply																
Generation (GWh)	672	727	784	844	907	973	1,042	1,115	1,192	1,272	1,356	1,435	1,518	1,606	1,699	1,797
Solar	0	0	0	0	0	67	67	67	67	67	133	175	225	283	350	416
HFO	141	141	191	630	643	761	805	851	900	951	1,040	1,071	1,099	1,108	1,110	1,116
Diesel	531	585	593	214	264	146	171	197	225	255	183	189	194	216	239	265
Consumption (GWh)	592	640	680	743	798	856	917	981	1,049	1,119	1,193	1,263	1,336	1,413	1,495	1,581
Losses (GWh)	81	87	93	101	109	117	125	134	143	153	163	172	182	193	204	216

Source: Le Secteur de l'énergie au Tchad – Pistes de Solutions pour une Electricité Disponible et Accessible, Technidev, Octobre 2019 ; SNE Activity Report – 2017 ;/ World Bank Power Sector Note for the Republic of Chad, June 2018



Sensitivity analysis

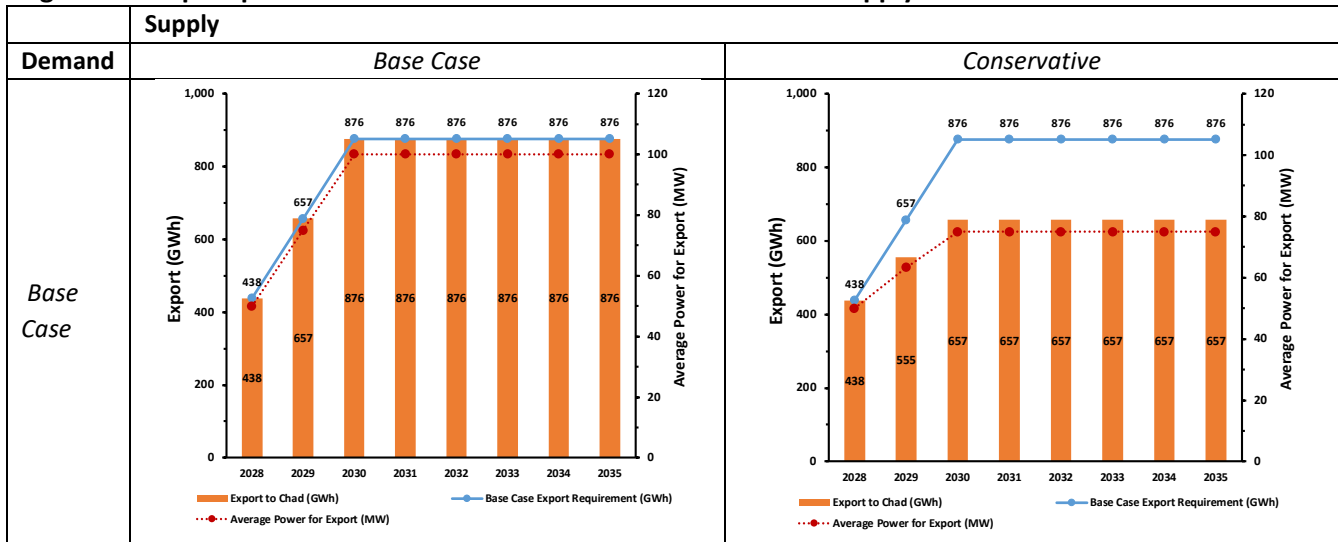
20. A sensitivity analysis has been performed to further test the ability of Cameroon to accommodate both domestic and export demand under more difficult circumstances up to 2035, such as a high demand growth and delays or derails in the commissioning of major power plants in the country (Table 3.11). Specifically, in terms of supply capacity, the analysis considers a “conservative” scenario, which corresponds to the base case without the construction of the Grand Eweng project in the Sanaga river basin.

Table 3.11: Overview of sensitivity analysis for export potential in Cameroon

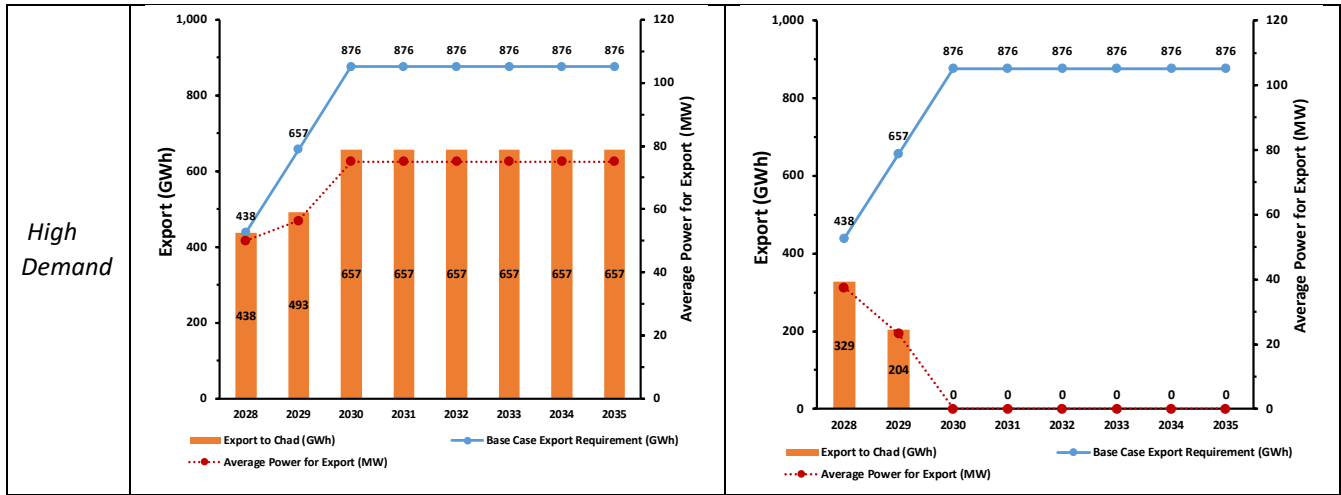
	Supply	
Demand for Cameroon	Base Case	Conservative
Base Case	As per Table 3.5	Base case without Grand Eweng (700 MW by 2028)
High Demand	As per Table 3.5	Base case without Grand Eweng (700 MW by 2028)

21. The sensitivity analyses for changing demand and supply conditions in Cameroon (Figure 3.7) demonstrate that except for the most conservative case, with a domestic demand in Cameroon reaching its highest estimate (about 7 percent growth per year) and delays in the commissioning of critical generation capacity additions, firm electricity exports of 75 MW can be guaranteed up to 2035. With the base case demand projections, Cameroon could guarantee exports of 75 MW up to 2035 even in the most conservative supply scenario resulting from exports of hydropower and gas plants during the off-peak period of the year. In case domestic demand grows faster than expected (High demand scenario) Cameroon could still meet an export requirement of 75 MW after 2030 with the base case capacity expansion plan. In the most pessimistic case of a high domestic demand and delayed commissioning of large hydro projects, exports could not be guaranteed after 2029. While recent electricity demand growth in Cameroon has been more in line with the base case scenario at 4-5 percent per year⁶⁴, a growth above 5 percent per year will require Cameroon to develop another HPP along the Sanaga river (e.g. the 550 MW Kikot project with EDF) or the 285 MW Katsina Alla project with Joule Africa to guarantee firm exports of 75 MW or above after 2030 to Chad. The high demand scenario in the near future is however highly improbable given the current COVID-19 crisis.

Figure 3.7: Export potential for Cameroon under different demand-supply scenarios

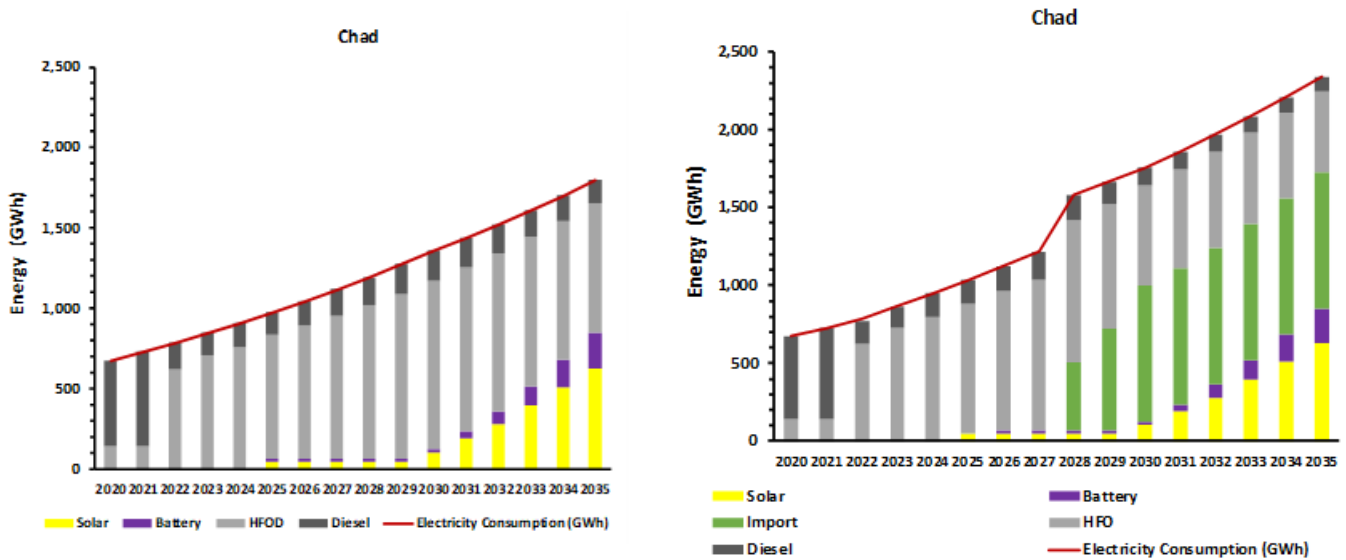


⁶⁴ Rapport Avant-Projet Sommaire Interconnexion RIS-RIN ; IED ; February 2020.



22. The team also investigated the impact of increased deployment of solar parks with battery storage in Chad.⁶⁵ Increased penetration of solar PV with batteries in Chad could take the share of solar energy (energy generated from the solar panels + energy discharged from the batteries linked to the PV plant) to 47 percent of the generation mix in the without project scenario (Figures 3.8-3.9 and Table 3.12). Nevertheless, Chad could still accommodate imports of firm energy in the amount of 50 MW in 2028 and 100 MW from 2030 onwards in the “with project” scenario, assuming the same capacity plan in Chad as for the “without project” scenario (Figure 3.8 and Table 3.13).

Figure 3.8. Chad’s energy requirements (2020-2035) without (left) and with (right) the Project under increased deployment of solar parks with battery storage



⁶⁵ The sensitivity analysis assumes an optimistic deployment of more than 500 MW of solar PV with batteries in Chad, doubling the share of solar energy in Chad’s generation mix in the “without project” scenario by 2035 versus the base case. The electricity injected into Chad’s grid from the solar parks with batteries is assumed to come from the PV panels for 70% of the time and from the discharge of stored energy for 30% of the time. The storage capacity of the battery is assumed to be 3 hours times the rated capacity of the solar panels. Solar PV is expected to be released during off-peak periods and stored energy during peak hours.



Figure 3.9: Chad's energy mix (2020-2035) without (left) and with (right) the project under increased deployment of solar parks with battery storage.

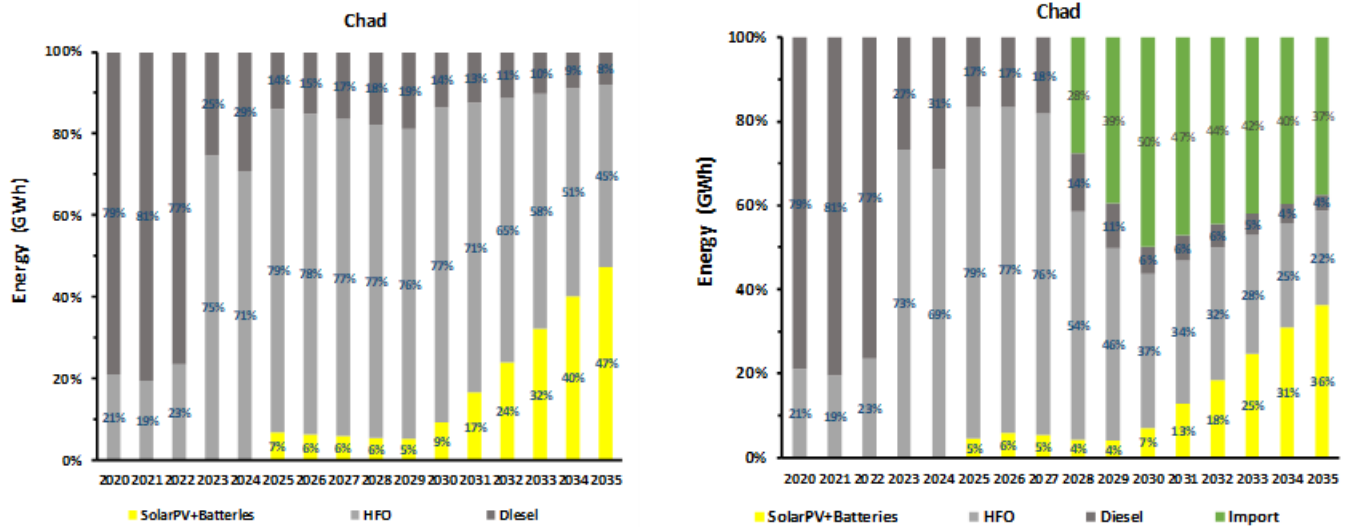




Table 3.12: Energy demand -supply balance for Chad’s grid (“without project”) under increased deployment of solar parks with battery storage (2020-2035)

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
WITHOUT PROJECT																
Demand																
Peak Load (MW)	111	120	130	140	150	161	173	185	197	211	225	238	252	266	282	298
Energy (GWh)	672	727	784	844	907	973	1,042	1,115	1,192	1,272	1,356	1,435	1,518	1,606	1,699	1,797
Supply																
Generation (GWh)	672	727	784	844	907	973	1,042	1,115	1,192	1,272	1,356	1,435	1,518	1,606	1,699	1,797
Solar						47	47	47	47	47	105	192	280	396	513	629
Battery						20	20	20	20	20	20	45	82	120	170	220
HFO	141	141	191	630	643	770	818	864	913	964	1,047	1,018	983	927	864	806
Diesel	531	585	593	214	264	136	158	184	212	242	185	180	173	164	152	142
Consumption (GWh)	592	640	680	743	798	856	917	981	1,049	1,119	1,193	1,263	1,336	1,413	1,495	1,581
Losses (GWh)	81	87	93	101	109	117	125	134	143	153	163	172	182	193	204	216

Table 3.13: Energy demand-supply balance for Chad’s grid (“with project”) under increased deployment of solar parks with battery storage (2020-2035)

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
WITH PROJECT																
Demand																
Peak Load (MW)	111	120	130	143	157	171	186	201	262	276	291	308	326	346	366	388
Energy (GWh)	672	727	784	865	948	1034	1123	1215	1582	1667	1756	1859	1969	2085	2209	2340
Supply																
Generation*(GWh)	672	727	773	865	948	1,034	1,123	1,215	1,144	1,010	880	983	1,093	1,209	1,333	1,464
Solar						47	47	47	47	47	105	192	280	396	513	629
Battery							20	20	20	20	20	45	82	120	170	220
HFO	141	141	182	634	651	817	869	928	860	764	642	634	621	589	553	523
Diesel	531	585	591	230	297	171	187	221	217	180	113	112	110	104	98	92
Import									438	657	876	876	876	876	876	876
Consumption (GWh)	592	640	680	767	847	931	1,018	1,110	1,455	1,534	1,616	1,711	1,811	1,918	2,032	2,153
Losses (GWh)	81	87	93	98	101	103	105	105	127	133	140	149	158	167	177	187

*Note: Generation refers to local generation in Chad (excluding imports).



ANNEX 4: Economic and Financial Analysis

COUNTRY: Africa

Cameroon - Chad Power Interconnection Project

A. Economic analysis⁶⁶

- 1. Project rationale and development impact.** The objective of the Project is to increase Cameroon's transmission capacity to enable the evacuation of electric power from the South to the North of Cameroon and to Chad. This is a strategic response to key energy sector priorities in both countries with Cameroon positioned to benefit from an integrated national power system which will allow it to develop and monetize its vast hydropower and Chad positioned to benefit from cheaper electricity imports from Cameroon. In Cameroon, the integration of the Northern and Southern grids will enable cost-effective hydropower concentrated in the South to reach the North, bridging electricity access and supply cost disparities across the country. In addition, excess power sold to Chad will provide revenue inflows into the Cameroonian electricity sector, which will alleviate its precarious financial standing and enable investments in system expansion and service delivery. In Chad, the Project will help reduce generation costs by displacing expensive diesel generation and provide energy for electricity access expansion. More so, the reinforcement of the electricity network in Chad would reduce technical losses by 4 percent and provide an additional 50,000 connections in the country.
- 2. Options Analysis.** The proposed Project was selected to be the least-cost technical solution based on technical studies at the national and regional levels. The Cameroon – Chad interconnection was identified as a top priority project under the CAPP 2030 Master Plan and its technical design informed by a detailed feasibility study and analysis of load flow, reactive power requirements, and steady state performances under system intact and contingency conditions. Similarly, the RIS-RIN interconnection was identified by Cameroon's PSDE as the most critical domestic transmission infrastructure, as it will provide the country with a long-needed national transmission network. A study assessed the economic merits of such an integrated national electricity system as opposed to a counterfactual autarchy scenario of isolated RIS and RIN. It concluded that the integration of the northern and southern power systems of Cameroon and further interconnection with Chad was the most efficient technical solution to meeting the identified challenges in all three systems.
- 3. Rationale for public financing.** Public financing is warranted for the Project because of the complex nature of cross-border electricity infrastructure development and the limited interest of the private sector in such businesses. Emerging business models are creating avenues for the private sector to invest in transmission infrastructure within and between countries, but interest remains low especially in sub-Saharan Africa, making public finance the most viable vehicle to deliver this project. However, the Project is expected to catalyze the GoC's efforts to develop its remaining hydroelectric resources as IPPs. Hence, the proposed Project is consistent with the WBG's MFD approach to infrastructure finance.
- 4. World Bank added value.** The World Bank's value added comes from its extensive expertise and experience in cross-border electricity network infrastructure development and rural electrification projects globally, and its ability to provide lower-cost concessionary financing to undertake such critical long-term infrastructure. The IDA grant to Chad,

⁶⁶ The economic analysis is consistent with the following guidelines: (a) World Bank IPF Policy and Directive; (b) Power Sector Policy and Investment Projects: Guidelines for Economic Analysis, (c) Discounting Costs and Benefits in Economic Analysis of World Bank Projects 2016.



co-financing with AfDB the cross-border interconnector has in fact been a critical determinant to close the funding gap and realize this Project.

Methodology: cost-benefit analysis

5. The economic analysis follows a standard cost-benefit framework, which compares the present value of incurred costs to the stream of attributable benefits. The EIRR and NPV so calculated inform the Project’s viability over its economic lifetime assumed to be 15 years. In this, the net benefits of the Project are calculated by comparing the economic costs and benefits of the “with Project” and “without Project” scenarios to determine whether the Project generates an economic surplus above its opportunity cost.

6. **Benefits.** The analysis has focused on those benefits associated with the Project that are more easily quantifiable, These include: (i) cost savings from the displacement of diesel/HFO generation in the North of Cameroon assessed at the cost of generation in RIN; (ii) electricity access expansion in North Cameroon assessed at the willingness-to-pay (WTP) in Cameroon; (iii) displacement of HFO/diesel-based generation in Chad through electricity imports from Cameroon assessed at the marginal generation cost in Chad; (iv) increased electricity access in Chad assessed at the WTP; and (v) technical loss reduction in Chad assessed at the marginal cost of generation in Chad⁶⁷. The substitution of electricity supply generated from diesel and HFO with cheaper hydroelectricity, is the main source of benefits. Since there is no WTP study available for either country and inadequate survey data on the consumption levels of alternate energy sources for its estimation, we use the average end-user tariffs for both countries as a proxy. It should be noted that electricity tariffs only provide a lower-bound estimate of WTP threshold, and thus lead to a conservative estimate of a Project’s economic benefits. Table 4.1 presents a summary of the key assumptions utilized to value economic benefits. In addition to these direct benefits, the Project presents some indirect ones which are difficult to value, predict and quantify with the available information. These include the impact of the Project on economic activity, improved network stability in Chad, and improved service delivery on the part of SNE as a result of technical assistance also financed under Component 3. These benefits are not included in the evaluation of the Project’s economic returns.

Table 4.1: Evaluation of Economic Benefits

Economic Benefit	Valuation
Marginal Cost of Generation in RIN	0.25 US cents per kWh
WTP in RIN	0.16US per kWh
Marginal Cost of Generation in Chad	0.24
WTP in Chad	0.25

7. **Costs.** Economic costs were estimated based on the preparatory studies undertaken for the Project and adjusted to remove duties and taxes. The capital cost of the investment component is assumed to be disbursed over a six-year period across the different project components. The main costs considered in the economic analysis are: (a) the CAPEX; (b) the OPEX; (c) the generation costs associated with the new demand enabled by the Project in Cameroon and Chad; (d) resettlement compensation costs; (e) project management costs; and (f) connection costs. Capital costs, including the contingency allocation, relate to the construction of: (i) the 225 kV transmission line to connect the RIS and the RIN; (ii) the 225 kV transmission line to connect Cameroon and Chad; (iii) HV and MV transformer stations; and (iv) rural electrification distribution networks. Operation costs are estimated as 2 percent of CAPEX. The cost per connection is assumed to be US\$350 in Chad and US\$150 in Cameroon. Generation costs for new demand is estimated at the marginal cost of generation in RIS. Details of the project costs are in are summarized in Table 4.2.

⁶⁷ Energy savings from the technical loss reduction satisfies part of the new demand from new connections and so valued at the cost of generation



Table 4.2: Project Costs

Cost Description	US\$ million
RIS-RIN 225 kV Interconnection	
Transmission Lines (Double Circuit/bundle)	178.1
Substations + Compensation Equipment	87.9
Resettlement Compensation	80.0
Implementation Support including OE	24.0
Cameroon-Chad 225 kV Interconnection	
Transmission Lines and Substations	245.0
COE for Interconnection	23.5
Chad Electricity Access and Network Reinforcement	
Infrastructure	33.0
Implementation Costs (Including OE)	8.0
Other Costs Outside Project Funds	
Annual Operating Costs	11.6
Annual generation cost of additional electricity	48.9
Total Connection Costs in Chad	17.5
Total Connection costs in Cameroon	24.6
TOTAL	782.1

8. **Energy Balance.** The load forecast utilized in this analysis is based on a demand-supply balance assessment conducted as part of the preliminary feasibility analysis of the Project and verified by the task team. Details can be found in Annex 3. In the “without project” scenario, RIS, RIN and Chad remain isolated and electricity demand is met with domestic electricity resources. In the RIS, energy demand is met with hydroelectricity and gas-powered plants on the margin for balancing. In the RIN, demand is met with domestic hydro and grid-connected diesel power plants. In Chad, demand is met with an HFO/ diesel – based generation portfolio and access rates and technical losses remain at current levels. In the “with project” scenario, the current isolated RIS, RIN and Chad are treated as one integrated system in which power flows from the South of Cameroon through the North to Chad. Power dispatch is based on an economic merit order with demand in the RIS satisfied first, and energy is evacuated to the RIN where diesel-based generation is displaced and energy demand from new connections is met with power from the RIS. A fixed contractual amount of energy is then exported to Chad where an equivalent amount of HFO/diesel-based generation is displaced by imports. In addition, there is a 4 percent reduction in technical network losses from the grid reinforcement and 50,000 new connections in the N’Djamena area.

Assumptions underlying the analysis

9. Table 4.3 presents a summary of the key assumptions utilized in the economic analysis. The Project is expected to have a seven-year implementation period with the benefits of the Project expected to set in from 2028 when the RIS – RIN and the Cameroon- Chad Interconnections are commissioned. CAPEX is assumed to be drawn down over 2022 to 2027 at rates of 10, 20, 30, 20, 10 and 10 percent per year, which corresponds to the assumed implementation period. An economic discount rate of 6 percent is used in the absence of a reliable economic growth projections for Cameroon and Chad in accordance with World Bank Economic Analysis guidelines.



Table 4.3: Main Assumptions

Project Life	15 years
Discount Rate	6%
Estimated losses reduction in Chad	4%
O&M Cost (percent of CAPEX)	2%
Cost of generation in Chad	US\$0.24
Contractual Import Volumes by Chad	50, 75, 100 MW
Interconnection losses between Cameroon and Chad	3%
Number of new Connections in Chad	50,000

10. **Results.** The economic analysis indicates that the project is economically viable with an NPV of US\$1,796 million, and an EIRR of 20 percent without climate benefits. The hurdle rate of the EIRR is crossed in 2033 when the EIRR is estimated at 7 percent. With climate benefits, the NPV and ERR of the project are estimated to be US\$1,983 million and 21 percent respectively under the low carbon price scenario and US\$2,714 and 22 percent respectively under the high carbon price scenario. See Figures 4.1 and 4.2.

Figure 4.1: Evolution of EIRR

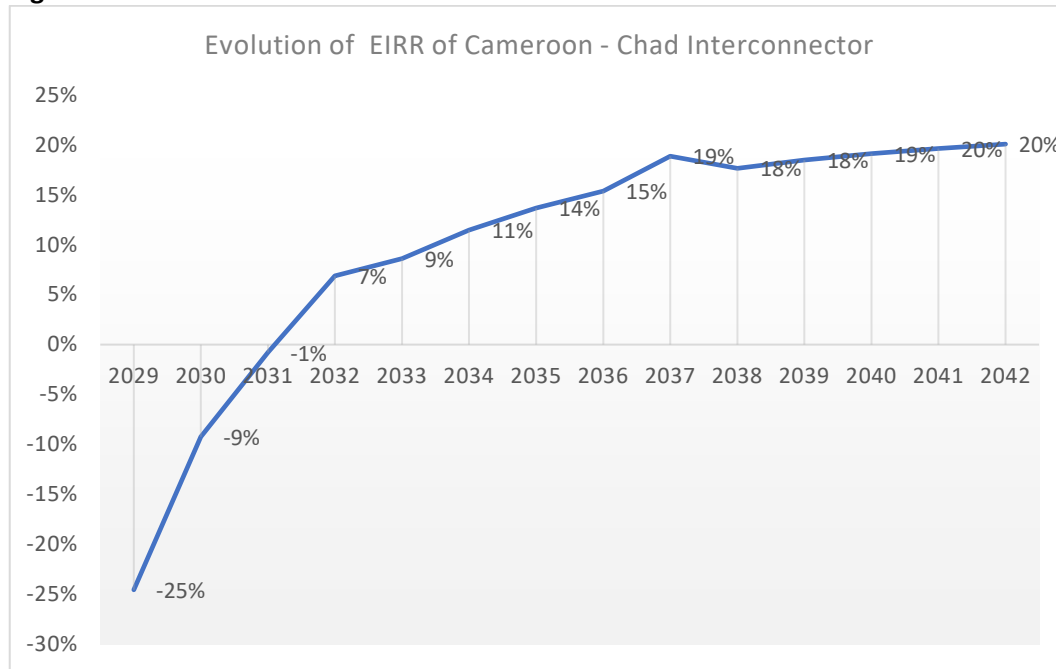
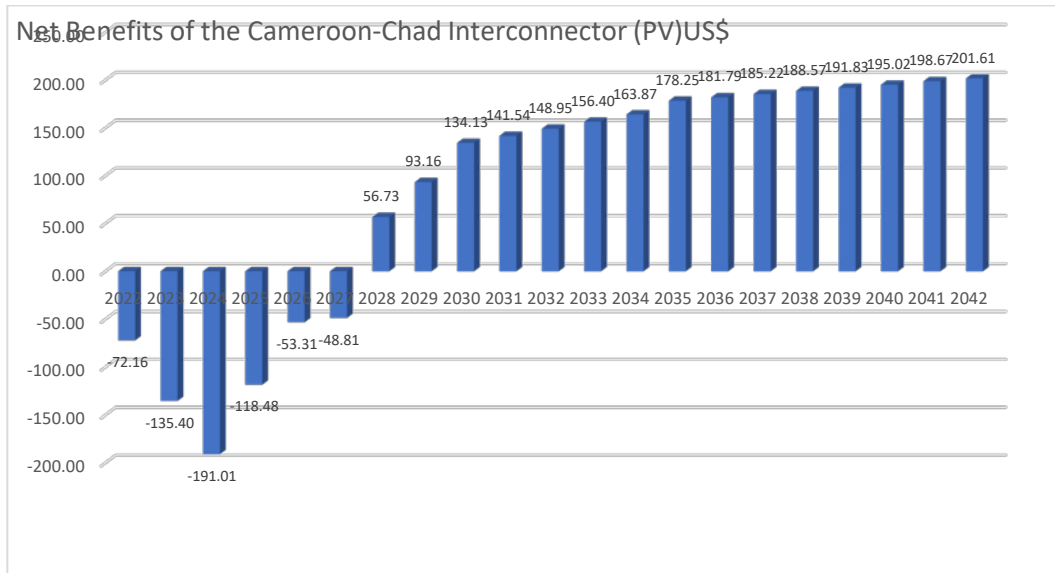




Figure 4.2: Net Benefits



Sensitivity Analysis.

11. Sensitivity analyses have been conducted to test the robustness of results against four main contingencies that may affect the Project: (i) delays in the development of planned hydroelectric capacity in Cameroon; (ii) substitution of HFO/diesel in Chad with HFO only; (iii) economic impact of the COVID-19 pandemic; (iv) persistent low Crude Oil Prices; and (v) increased deployment of solar PV parks with batteries in Chad.

12. **Delays in the development of planned hydroelectric capacity in Cameroon implies that exports to Chad will be predominantly gas-based.** Given the contractual nature of the transaction, the financial returns of the Project will remain unchanged. However, economic NPV and EIRR will be affected due to increased generation costs and a corresponding reduction in project net benefits in Chad. With delays in the construction of planned hydroelectric capacity, marginal economic costs per kWh is expected to be about US\$0.12 compared to US\$0.08 in the base case. Based on this assumption, it is estimated that the NPV of the Project will decrease to US\$1,630 million and EIRR to 19 percent. In addition to a reduction in the Project benefits, this situation could also have significant adverse distributional impacts in Cameroon. This is because, in order to meet the contractual obligations to Chad, Cameroon may be obliged to retain, in the generation portfolio, more expensive gas capacity scheduled for retirement. The higher marginal cost of such generation sources would imply higher electricity prices in Cameroon at the expense of consumers. These effects are however difficult to estimate with the existing information.

13. **If Chad decides to convert existing diesel plants in its generation portfolio to HFO plants, there would be a reduction in cost of fuel for power generation and a corresponding reduction in economic benefits of the Project (which is based on the avoided cost of generation).** The conversion could result in a reduction in generation costs in Chad by 50 percent (to US\$0.12). Nonetheless, the Project would remain economically viable with an NPV of US\$1,057million and an EIRR of 15 percent. Thus, there is a stronger economic rationale for Chad to import electricity from Cameroon instead of converting existing diesel plants to HFO.

14. **Economic Impacts of COVID-19 pandemic are moderate.** A substantial global recession is expected in the aftermath of the pandemic; however, its depth and duration cannot yet be determined. The World Bank (2020)



assessment of the impact of COVID-19 on sub-Saharan African countries categorized the economic impact on Cameroon as low based on the country's relatively low trade with China, its low percentage of remittances as a percentage of GDP, and low international tourism receipts as a percentage of total exports. Also, it is reasonable to expect that the effects of the pandemic would be minimized by the time of project commissioning, based on the current expectations on infection rates and mortality levels. With respect to project construction, no major delays are expected since this is planned to begin in 2022.

15. **Crude oil prices collapse would decrease the Project's economic returns, but the Project would remain viable.** Crude oil prices have been falling for most part of early 2020, collapsing to negative prices in April 2020 with the spot prices of liquified natural gas (LNG) already fallen to record low levels partly as a result of the COVID-19 emergency as well as the inability of swing crude oil suppliers to reduce their supplies to stabilize the market. Given the expected commissioning date of the Project and the unavailability of new oil price projections under these circumstances, an informed assessment of how the current market dynamics could affect the Project cannot be made. However, a sensibility analysis has been carried out assuming a theoretical scenario under which the decrease of crude oil prices results in a reduction in generation costs by 50 percent in Cameroon's northern power system and Chad. The analysis estimates that the Project remains economically with an NPV of US\$356 million and an EIRR of 10 percent.

16. **Increased deployment of solar PV parks with batteries in Chad would not impact the Project's economic benefits.** The development of solar PV parks with batteries could increase the share of solar-based energy in Chad's energy mix to 47 percent in the "without project" scenario and 38 percent in the "with project" scenario; nonetheless, HFO/Diesel based plants will remain the marginal units. Upon completion of the cross-border interconnector and with firm imports from Cameroon of 50 MW in 2028 and 100 MW in 2030, HFO/Diesel-based generation would continue to be displaced as in the base case. Therefore, increased deployment of solar PV parks with batteries in Chad will not impact the project benefits. Nevertheless, there will a reduction in average generation costs for Chad.

B. Financial analysis

17. A financial analysis has been performed for the Project as a whole, taking into consideration the investment outlays and the cash flow accruing to the two implementing companies (SONATREL and SNE) as a result of the Project.

18. **Costs.** Cash outflows are represented by: (i) investment costs for Components 1, 2 and 3 (comprising counterpart funding for land acquisition and other compensations; as well as OE costs and the contingency allocation), irrespective of the source (AfDB, IDA) and type of financing (credit or grant); (ii) operating and maintenance costs estimated at 2 percent of capital costs; and (iii) incremental cost of generating additional electricity. The Weighted Average Cost of Capital (WACC) of the Project was derived taking into account the credit, government equity and grant portion of the total financing. The WACC of 1.8 percent is used as the financial cost of capital.

19. **Benefits.** Financial benefits of the Project (cash inflows) derive from: (i) electricity exports to Chad; (ii) revenues from meeting constrained demand in northern Cameroon; (iii) revenues from increased access in Chad; and (iv) savings in generation costs from reduction in technical losses in the N'Djamena grid.

20. Current unit cost of electricity generation in Chad is approximately US\$0.24/kWh (CFA 140/kWh). However, there are plans to convert up to 80 percent of diesel plants to HFO. If the biggest power plant of SNE – Farcha 2 of 60 MW is switched from diesel to HFO and the cost of electricity coming from the refinery power plant (NRC) of 10 MW is brought in line with actual costs, the average domestic power generation cost in Chad will be reduced to US\$0.19/kWh (CFA 110/kWh). Consequently, the benefits from the interconnector can be shared by both countries if the export price to be



agreed in the PPA lies between US\$0.12/kWh and US\$0.19/kWh excluding wheeling charges. Given that a PPA between Cameroon and Chad is yet to be signed, the analysis uses US\$0.15/kWh as a base case and carries out sensitivities on changes in export prices. According to the supply-demand balance analysis for Cameroon, electricity exports to Chad may be guaranteed by a combination of resources, including supply from gas-fueled thermal plants. Since electricity is priced at the margin, the financial analysis assumes the marginal cost of gas-based thermal generation in Cameroon (estimated at US\$0.12/kWh) as the lower boundary of the PPA price. Also, wheeling charges are assumed to be US\$0.02/kWh (CFA 10.6/kWh) in line with ARSEL regulation on SONATREL’s wheeling charges.

21. **Results.** The financial analysis of the Project under the base case export price scenario shows that the Project is financially viable with an NPV of US\$280 million and a financial rate of return (FIRR) of 5.1 percent. The Project remains financially robust with FIRR above the hurdle rate of 1.8 percent under varying PPA export price assumptions. Given the financial analysis is valued based on i) regulatory tariffs and contractual prices under a PPA to be agreed and ii) a stream of net financial benefits that will begin to accrue in 2028 (for the interconnector) and 2023 (for the Chad component), the impact of COVID-19 on the financial analysis of the project is minimal.

Table 4.4: Sensitivity of Project Financial Returns to Export Price under PPA

PPA Export Price	Wheeling Charge	FNPV	FIRR
US\$/kWh	US\$/kWh	US\$ million	%
0.13	0.02	86	2.9
0.15	0.02	280	5.1
0.17	0.02	474	7.0

B. Sector financial analysis

Cameroon – ENEO/SONATREL

22. **The financial performance of the energy sector in Cameroon is dependent on the financial performance of the key stakeholders – ENEO and SONATREL.** Despite being a profitable entity, ENEO is heavily burdened with a tightened cash flow position that has affected the overall health of the company. SONATREL on the other hand is a relatively new entity whose opening balance sheet is yet to be agreed upon.

23. **There are three main challenges to achieving financial sustainability in the sector:** (a) improving the operational performance of ENEO, as technical and commercial losses are high at 30 percent; (b) reducing delays in the payment of electricity bills from the Government, parastatal institutions and municipalities, and in the payment of the tariff compensation by the Government; and (c) full operationalization of SONATREL and completion of asset transfer.

24. **ENEO has experienced increased electricity sales over the past five years owing to an increase in demand from its LV customers of approximately 5 percent per year** (in line with demand growth) and increased hydropower capacity thanks to the regulating effect of Lom Pangar. The company’s earnings before interest, tax, depreciation and amortization (EBITDA) has improved over the 2016-2018 period as quinquennial regulatory targets were reset to reflect the reality of the company’s lackluster performance. Slight improvement in distribution efficiency and good cost control resulted in a 44 percent increase in net income and net income margin over the same period. A summary of ENEO’s financial statements is as below.



Table 4.5: ENEO Summary Financials

	(XAF billions)					(EUR millions)				
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
Income Statement										
Revenue	270	274	291	309	300	411	418	444	471	458
- Electricity Sale	247	259	260	276	290	376	395	396	421	442
- Compensation	17	6	20	24	3	27	9	31	37	4
EBITDA	61	35	55	49	58	93	54	84	75	88
<i>EBITDA Margin</i>	23%	13%	19%	16%	19%	23%	13%	19%	16%	19%
Net Income	2	-20	6	4	11	3	-30	9	7	17
<i>Net Income Margin</i>	1%	-7%	2%	1%	4%	1%	-7%	2%	1%	4%
Balance Statement										
Total Assets	647	649	704	725	700	986	989	1,073	1,105	1,067
Account Receivable	89	93	131	204	191	136	142	200	311	291
Account Payable	29	41	74	152	173	44	62	113	232	264
Cash Flow Statement										
CF from operation		17	71	52	18	-	27	108	79	27
CF from investment		(31)	(39)	(36)	(31)	-	(47)	(59)	(54)	(47)
CF from financing		7	(33)	(22)	7	-	10	(50)	(34)	11
Change in Cash		(7)	(1)	(6)	(6)	-	(10)	(1)	(8)	(9)
Working Capital Ratios										
Days Receivable	120	124	164	241	232					
Days Payable	102	108	194	373	454					
Current Ratio	0.9	0.7	0.6	0.6	0.6					

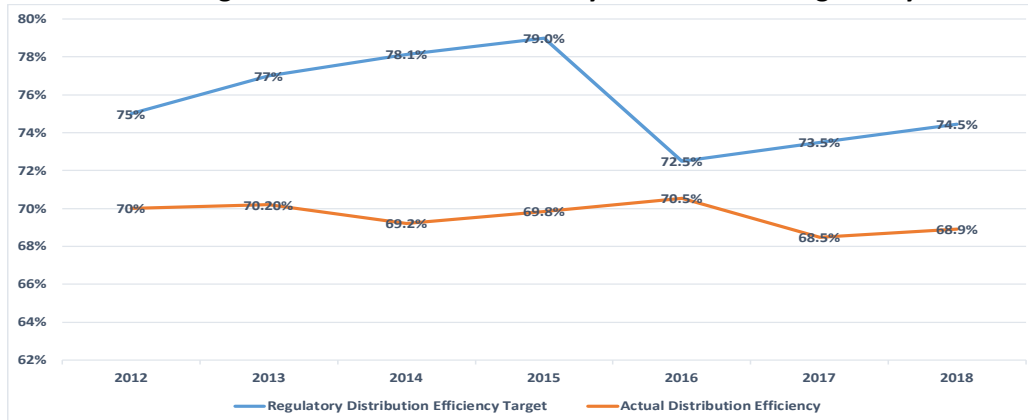
Key drivers of financial performance of Cameroon's energy sector

25. **Relatively high cost of generation and lack of cost-reflective tariffs.** The costs of electricity service in Cameroon are relatively high, as a result of a reliance on expensive liquid-fueled thermal generation and poor operational performance. Electricity tariffs charged by ENEO, at an average of about US\$0.14/kWh, stand above the regional average of US\$0.13/kWh and the regional average for countries with hydro-based power systems of US\$0.10/kWh. Despite the high tariff, the sector cannot achieve full cost recovery without GoC subsidies. Over the period 2014-2018, the GoC has paid ENEO an average yearly tariff compensation of EUR 22 million.

26. **Poor operational performance which impacts overall profitability.** ENEO's operational performance, as measured by its distribution efficiency relative to regulatory targets is a key determinant of the amount of compensation it receives from the GoC. Current distribution losses are around 30 percent and ENEO failed to meet targets provided for it by the regulator for the 2011-2015 period. This negatively impacted its EBITDA. Since the regulatory target reset occurred in 2016, ENEO's EBITDA has improved. Nevertheless, this operational metric will continue to negatively impact ENEO's compensation and financial situation if the company fails to increase its efficiency in tandem with the expected evolution of 1 percent increase p.a. over the 2016-2020 period.



Figure 4.3: Distribution Efficiency: Actual versus Regulatory



27. **Significant arrears from GoC and parastatal institutions which create a tight liquidity situation.** Account receivables have steadily increased over time due to the delay in receiving yearly compensation from the GoC. As of January 2020, arrears from GoC and other state-owned entities including Alucam and Camwater to ENEO were estimated at FCFA196 billion⁶⁸ (EUR 298 million). This amount includes a disputed FCFA49 billion compensation for the early termination of ENEO’s transport concession. For its part, ENEO had accumulated FCFA75 billion⁶⁹ its suppliers including KPDC and DPDC. In turn, the power suppliers accumulated arrears to their fuel suppliers and financiers creating liquidity problems all along the value chain. This has led to a vicious circle where ENEO is not generating enough cash to invest and improve its distribution performance, and is thus penalized under the tariff formula, which leads to a further deterioration of its financial health. Estimates of the cross-debt situation from the point of view of Ministry of Finance are depicted in Table 4.6.

Table 4.6: Cross Debt Arrears between ENEO, Public and Private Sectors as of November 30, 2019 in CFA billion

Net Arrears from the GoC to ENEO	32.4
Net Arrears from SOEs to ENEO	49.4
ALUCAM	34
CAMWATER	13.2
CAMTEL	2.2
Net Arrears from ENEO to SOEs	116.7
SONATREL	10
EDC	30
TRADEX	48.7
SONARA	16
AGGREKO	1.6
ALTAAQA	5.6
GAZ CAMEROUN	4.9
Net Arrears from ENEO to Private Companies	50.4
KPDC	44
DPDC	6.5

Source: Ministry of Finance

⁶⁸ Source: Globeleq.

⁶⁹ Source: Globeleq.

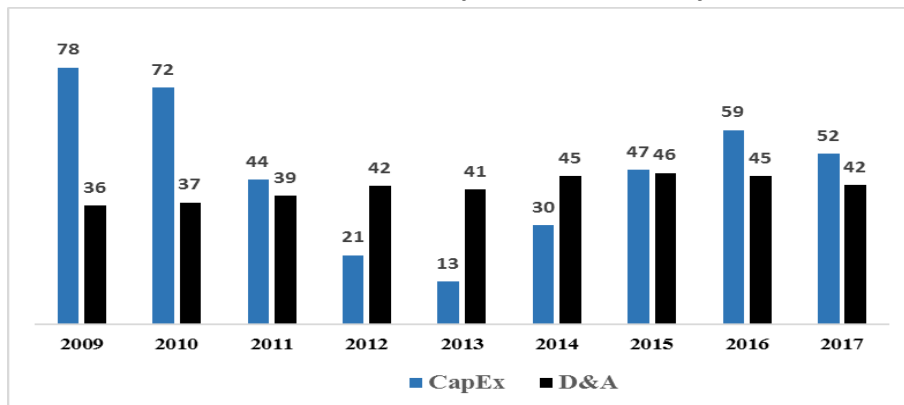


28. **A debt clearance program is under preparation by the GoC** following discussions between ENEO and parastatal institutions, which is expected to include: (i) raising FCFA 45 billion through a bond to repay ENEO; and (ii) repaying FCFA50 billion via monthly payments of FCFA3.0 billion from the state budget. For future supply of electricity, the GoC intends to pay FCFA1 billion weekly from its budget to ENEO. These arrangements are still under discussion.

29. **Insufficient investment in assets impacts compensation from the GoC.** CAPEX investments that ENEO makes above the amount of depreciation of its asset base are incentivized through a 15.19 percent return premium incorporated in the regulatory compensation formula. The formula symmetrically penalizes ENEO if it invests less than the depreciation amount. An annual investment of EUR 45 million would be required to maintain ENEO’s depreciating asset base at the same level, but at least EUR 76 million are estimated to be needed yearly to boost the company’s efficiency and reduce its losses.

30. AES SONEL’s poor management and commitment during 2011–2014 left the company stranded with increasing losses as investments were as low as EUR 13 million in 2013. After taking over ENEO in 2014, Actis increased its capital investments, but the company’s liquidity issues have made it impossible to deploy enough capital to considerably reduce distribution losses.

Table 4.7: Annual Capital Investments by ENEO



Source: ENEO Financial Statements

31. The liquidity situation is costly to manage. Operating cash flows have slightly improved over the 2015-2017 period from CFA 17 billion to CFA 52 billion but were still too low to cover the investment needs of ENEO. The company has therefore resorted to borrowing in the commercial market to meet its principal repayments on long term debt and make essential investments.

SONATREL

32. **The TSA between ENEO and SONATREL are yet to be signed** even though SONATREL officially began operations in January 2019. The delay is largely due to two factors that are yet to be agreed between the stakeholders: (i) the compensation amount to ENEO for the early termination of its transmission concession contract; and (ii) the wheeling tariff that would be applied to energy transmitted within the network. The lack of agreement on the value of the assets to be transferred has prevented SONATREL from concluding on the assets and liabilities on an opening balance sheet, while the dispute over the wheeling tariff has had a negative impact on the amount of revenues collected by SONATREL.

33. **Disputes over the compensation amounts is a hindering factor to SONATREL’s financial reporting and completion of asset transfer.** ENEO claims it is owed CFA 49.2 billion from the GoC for the early termination of the



transmission concession contract. This amount is significantly higher than the regulatory value of compensation calculated by ARSEL. The regulator estimates a compensation amount of CFA 5.9 billion owed by ENEO and payable to the GoC. This significant discrepancy is being investigated by a working group within the Ministry of Energy.

34. **SONATREL is yet to receive the full value of the wheeling tariff as revenues.** The wheeling tariff of FCFA 10.626/kWh set by ARSEL for 2019 is yet to be accepted by ENEO. For the 5849 GWh transmitted by SONATREL during 2019, the company holds receivables in the amount of FCFA 62 billion, which includes FCFA 40 billion from the GoC as compensation for the transmission cost that is not passed through the retail tariff to the end user. Of the amounts invoiced to ENEO (approx. FCFA 54 billion) based on the rate fixed by ARSEL, only FCFA 7.1 billion (about 13 percent) has been paid to SONATREL. Transport losses remain high at 6.9 percent on average, reaching as high as 40 percent on the Yaounde-Douala network. As a result, SONATREL is in a financially weak situation with no guaranteed collected revenues for 2020.

35. The successful implementation of the Project would be a significant achievement for SONATREL who stands to improve its financial situation from the receipt of wheeling revenues. It also positions it as a critical transport company within the CAPP.

Chad – SNE

36. **The financial performance of SNE has been consistently weak** despite significant subsidies from the Government of Chad. Even though it’s EBITDA remained relatively flat over the 2016-2018 period, net results were negative over the same period. Cash flow from operations have improved year by year as SNE has managed to improve its working capital management. Arrears from its clients, most notably public sector clients, are significant and increasing. As a result, SNE has delayed payment to its suppliers and relied on commercial borrowing to meet its financial obligations.

Table 4.8: Summary of SNE’s Financial Statements

	(XAF billions)					(EUR millions)				
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
Income Statement										
Revenue	45.3	73.8	77.7	94.9	86.2	69.0	112.5	118.4	144.6	131.4
- Electricity Sale	21.0	35.7	41.5	44.4	39.2	32.0	54.4	63.2	67.7	59.7
- Compensation	21.9	34.0	31.6	48.3	44.7	33.5	51.9	48.1	73.7	68.2
EBITDA	1.8	2.2	4.1	4.5	4.6	2.8	3.3	6.3	6.9	7.0
EBITDA Margin	4%	3%	5%	5%	5%	4%	3%	5%	5%	5%
Net Income	(1.8)	(1.4)	(1.1)	(0.6)	(1.1)	(2.8)	(2.1)	(1.7)	(0.9)	(1.7)
Net Income Margin	-4%	-2%	-1%	-1%	-1%	-4%	-2%	-1%	-1%	-1%
Balance Statement										
Total Assets	114.0	133.9	158.4	179.8	145.8	173.7	204.1	241.5	274.1	222.3
Account Receivable	17.9	40.1	63.1	83.2	101.5	27.3	61.1	96.2	126.9	154.8
Account Payable	24.7	35.5	52.5	68.3	86.8	37.7	54.1	80.0	104.2	132.3
Cash Flow Statement										
CF from operations		(7.4)	(0.6)	1.6	10.5		(11.3)	(0.9)	2.4	16.0
CF from investments		(3.0)	(5.6)	(5.5)	(7.5)		(4.5)	(8.6)	(8.5)	(11.4)
CF from financing		4.3	13.4	14.4	7.3		6.5	20.4	22.0	11.2
Change in Cash		(6.1)	7.2	10.4	10.3		(9.4)	10.9	15.9	15.7
Ratios										
Days Receivable	145	198	297	320	430					
Days Payable	260	216	313	308	445					
Current Ratio	0.9	1.0	1.1	1.2	1.1					



Key drivers of financial performance of Chad's energy sector

37. **High costs of generation, lack of cost reflective tariffs and over reliance on subsidies.** The unit costs of electricity generation in Chad is estimated at US\$0.24/kWh. When distribution and transmission costs are considered, the average cost of service is approximately US\$0.43/kWh. This is well above the end-user retail tariff of US\$0.25/kWh (FCFA 140/kWh). As a result, SNE relies heavily on government subsidies to compensate for the loss in revenue. For instance, in 2018, the amount of compensation received from the Government were higher than the revenues from electricity sales; FCFA 44.7 billion (EUR 68.0 million) versus FCFA 39.2 billion (EUR 59.7 million). The Government of Chad provides subsidies in kind in the form of fuel supplied to SNE and the IPPs for electricity generation. This has implications on the budget of the State.

38. **Low technical and commercial efficiency.** SNE's financial performance is negatively impacted by its poor operational and commercial performance. Distribution losses amounted to 35.2 percent in 2017 with a bill collection ratio of 43 percent. As a result, only about 28 percent of revenues for generated electricity is collected due to fraud, non-payment, deficient or no metering, particularly in the case of public sector clients and public lighting.

39. **Significant arrears from both public and private sector clients.** Billing to SoEs and other public clients account for almost 30 percent of total billing in N'Djamena even though they represent less than 6 percent of the total customer base. Large private and public customers supplied in medium voltage represent less than 1 percent of the total customer base but account for over 55 percent of total billing. Due to non-payment of these clients, accounts receivables of SNE has steady increased to over a year (430 days) negatively impacting the overall liquidity of SNE.

Impact of imports from Cameroon on State Subsidies

40. Currently, the Government of Chad provides an average of 8.4 trucks of fuel daily to SNE as a form of subsidy to cover the differential between the cost of service and the retail tariff. The amount paid by the Government of the Chad for the fuel is sensitive to fluctuations in oil prices. In 2017, it was as high as EUR 74 million, which is significant for a country like Chad with budgetary constraints. The financial analysis shows that as demand grows, if 100MW of domestic thermal production are replaced with imports from Cameroon, the Government of Chad could save EUR 88 million (US\$98 million) in subsidies annually, assuming an average cost of fuel of US\$112.4/MWh.



ANNEX 5: Gender Gap Analysis

COUNTRY: Africa

Cameroon - Chad Power Interconnection Project

Rationale: Why a focus on gender in energy matters?

1. Access to reliable household energy, clean and efficient cookstoves, and public lighting can reduce energy poverty, time spent on drudgery and give women and men additional income-earning opportunities. Economic opportunities and social dynamics affect which of the above can have the highest impact and are realistic to be achieved. Specifically, in Chad, some key elements to consider are presented below.
2. **Distribution of household heads:** 22.1 percent of households in Chad are headed by females. The share is slightly higher in urban areas in general (23.6 percent); however, it is lower in N'Djamena (19.3 percent), (see table below).

Table 5.1: Households by sex of head and location

Location	Male	Female
Nationwide	78.0%	22.1%
Urban	76.5%	23.6%
Rural	78.4%	21.6%
N'Djamena	80.7%	19.3%

Source: Chad DHS (2015) and author's calculations

3. **Income and productive asset ownership:** Women see their productive activities constrained due to high fertility and limited agency and access to resources. Chad has one of the highest fertility rates in the world (5.8 births per women) which severely affects women's capacity to participate in the labor market.⁷⁰ Women also lack agency for personal decisions, only 23 percent of women were responsible for deciding whether or not to work.⁷¹ In addition, women have lower access to factors of production, such as land, farming inputs, and livestock. Women's lower access to land is due to traditional attitudes and gender discrimination in customary/religious law, with women mainly accessing land through male relatives and family, meaning that widows are especially vulnerable.⁷²

Chad Gender Gap Analysis

4. **In order to gain insights into key gender gaps, a preliminary analysis was conducted for Chad.** The aim was to look at potential gender gaps from multiple data sources and determine which one of the key gender gaps the electrification project could impactfully address.
5. **Poverty:** In both Chad's Household Consumption and Informal Sector Surveys carried out in 2003 and 2011, the monetary poverty rate among female-headed households was lower than the rate for male-headed households. In the most recent one (2011) the poverty rate for female-headed households was 42.6 percent, compared with 47.4 percent for households headed by men.⁷³ However, despite this, female-headed households experienced slightly higher

⁷⁰ UN fertility data (2017) <https://www.un.org/en/development/desa/population/publications/dataset/fertility/wfd2017.asp>

⁷¹ World Bank (2015) Systematic Country Diagnostic, Chad. <http://documents.worldbank.org/curated/en/764161468190178476/pdf/96537-SCD-P151731-IDA-R2015-0244-IFC-R2015-0257-MIGA-R2015-0077-Box393200B-OUO-9.pdf> pg 15.

⁷² World Bank (2015) Systematic Country Diagnostic, Chad. <http://documents.worldbank.org/curated/en/764161468190178476/pdf/96537-SCD-P151731-IDA-R2015-0244-IFC-R2015-0257-MIGA-R2015-0077-Box393200B-OUO-9.pdf> pg 22

⁷³ UN Country profile (2016) https://www.uneca.org/sites/default/files/uploaded-documents/CountryProfiles/2017/tchad_cp_eng.pdf



multidimensional poverty than male-headed households. Multidimensional poverty is measured as an index that includes information about education, health, housing, employment, empowerment, dignity, and personal security, among many others.⁷⁴ Similarly, 39.2 percent of female-headed households are in the bottom wealth quintile, compared to 21.2 percent of those headed by males.

6. **Access to electricity: by sex, location, and wealth:** 7.7 percent of all households have access to electricity in Chad. Male-headed households present higher access to electricity (8.3 percent of all male-headed households versus 5.7 percent of female-headed households). This gender gap persists when looking at urban and rural locations or wealth quintiles. In urban areas, the rates of male and female-headed households with access are 35.5 and 22.6, respectively. In rural areas, the rates are 0.8 percent and 0.4. Last, the rates in N'Djamena are 51 percent for male-headed households and 43.8 for female-headed households (see table below).

Table 5.2: Households with access to electricity, by sex of head and location

Location	Male	Female	All
Nationwide	8.3%	5.7%	7.7%
Urban	35.5%	22.6%	32.5%
Rural	0.8%	0.4%	0.7%
N'Djamena	51.0%	43.8%	49.6%

Source: Chad DHS (2015) and author's calculations

7. The gap in electricity access is also visible when looking at quintiles of wealth, although it only becomes sizable when the highest quintile is considered. Among all male-headed households in the top quintile, 40.9 percent have access to electricity while the rate lowers to 29.79 percent for female-headed households.

Table 5.3: Households with access to electricity, by sex of head and wealth quintile

Location	Male	Female	All
poorest	0.01%	0.03%	0.01%
poorer	0.22%	0.01%	0.18%
middle	0.54%	0.05%	0.46%
richer	1.52%	1.52%	1.52%
richest	40.86%	29.79%	38.50%

Source: Chad DHS (2015) and author's calculations

8. **Access to electricity for cooking:** Most households in Chad rely on wood for cooking (87.8 percent) followed by charcoal (6.5 percent of all households). Only 2.9 percent of households use either electricity, LPG, or natural gas as their main fuel for cooking. 3.1 percent of male-headed households rely on either of these fuels compared to 2.1 percent of female-headed households.

⁷⁴ World Bank (2013) Dynamics of Poverty and Inequality following the Rise of the Oil Sector. <http://documents.worldbank.org/curated/en/201821468015589462/Chad-Poverty-note-dynamics-of-poverty-and-inequality-following-the-rise-of-the-oil-sector>



ANNEX 6: Climate Co-benefits

COUNTRY: Africa

Cameroon - Chad Power Interconnection Project

Adaptation Deficit Countries

1. Chad, which is the most vulnerable country in the world to climate change according to the 2016 Climate Change Vulnerability Index⁷⁵, and Cameroon have significant “adaptation deficits” with respect to addressing the multiple climate change risks. At the same time, both countries lack institutional and community capacities to adapt to climate change impacts.

2. Cameroon and Chad both face significant climate change-related risks due to flooding (river, urban and coastal) and extreme heat and water security that jeopardize infrastructure and living conditions of the population, especially poor and marginalized communities. Chad, in particular, is very vulnerable to extreme heat and the average expected temperature increase over the next fifty years is expected to be above the worldwide average.⁷⁶ Heat stress, from prolonged exposure to extremely high temperatures, as well as water scarcity as a result of drought, are expected to occur at least once in the next five years and have an impact on the health and livelihood of millions of vulnerable people in this already stressed country. Persistent drought has caused the acceleration of desertification in the northern part of the country. As a result, agro-pastoral areas have declined and livestock grazing areas has shifted further south. Climatic forecasts by NASA have indicated that Lake Chad could disappear in 20 years at the current rate of water use and increased silting of upstream rivers. Endemic diseases such as malaria are highly prevalent, and the country routinely suffers from epidemics of cholera, measles, and meningitis.

3. Climate risks, especially those related to extreme heat and flooding, have been considered in project design during preparation and will be taken into account during implementation. Efforts have been made to make the project itself more resilient (“adaptation of the project”) as well as to contribute to greater resilience and increase in the adaptive capacity of project beneficiaries and the surrounding communities (“adaptation through the project”).

Adaptation of the Project

4. Potential route options for the transmission lines are being assessed for flooding risk under the preliminary environmental studies that seeks to minimize environmental impacts to biodiversity as well as risks from excessive heat, water scarcity and forest fires. The Project will apply tailored design and technologies to enhance the resilience of the transmission and distribution infrastructure to adapt to the climate risks identified, in particular the risks of flooding and extreme heat. The project design will optimize the location and route of each of the transmission lines to minimize the risk of flooding. These measures include appropriate design for the foundations of towers (chimney extension) and provision has also been made for adequate draining system of the platforms for substations, protecting the infrastructure most likely be at risk of flooding in both countries. The project will finance the design, supply and installation of adapted equipment (conductors, transformers, HV and MV switchgear, etc.) with specific requirements for the extreme high temperatures expected in Chad and Cameroon.

Mitigation through the Project

5. The Project provides much-needed clean energy access to under-served communities in Northern Cameroon and

⁷⁵ UN-OCHA. 2015. “Chad Country Profile.”

⁷⁶ Intergovernmental Panel on Climate Change (IPCC). 2015. “IPCC Fifth Assessment Report.”



Chad. Cameroon's southern power system is expected to add 1.3 GW of hydropower capacity in the coming years, with hydropower plants being developed at Nachtigal (420 MW by 2024), Grand Eweng (700 MW by 2028), and Memvele (180 MW by 2021). The proposed Project, through Components 1 and 2, will support the construction of nearly 1,600 km of HV transmission lines to transport surplus electricity from Cameroon's hydro-dominated power grid to communities in Northern Cameroon and Chad, which relies on HFO/diesel in electricity generation.

6. The Project will be instrumental in greening the energy mix for electricity generation of both countries by replacing HFO/diesel power generation with hydropower-based electricity. Specifically, access to hydropower from the RIS will allow to completely phase out HFO/diesel-based power generation in the Northern Cameroon, while electricity imports from Cameroon will allow Chad to decrease the share of HFO/diesel from 100 percent in 2020 to 43 percent by 2030. Also, the interconnect between the two countries will facilitate the development of solar energy in Chad, which is projected to increase from zero to nearly eight percent in 2030, and subsequently export of solar energy to Cameroon. In addition, the project will support investments in loss reduction of the power grid of N'Djamena, and thus will further contribute to climate mitigation benefits.

Adaptation through the Project

7. The low electricity access of about eight percent in Chad and 46 percent in Northern Cameroon coupled with the unaffordability of self-generation of electricity contribute to the adaptation deficit of the fragile communities in the region, especially to their poorest and most vulnerable people.⁷⁷ Improved electricity access and reduction in outages supported by the project in Cameroon and Chad will enable poor and vulnerable beneficiary households not only to use cooling appliances such as fans and have better access to clean water, but also to support productive livelihoods. In addition, electricity access will have adaptation benefits with respect to health as hospitals and clinics will receive power required to maintain refrigeration for vaccines and the operation of life-saving equipment. Furthermore, technical assistance provided to the project implementation entities—SONATREL and SNE—will help these entities increase capacity with respect to design and operation of power sector assets adapted to climate risks.

⁷⁷ Thinkhazard. 2020. "Report for *Chad and Cameroon*."