



Swedish International
Development
Cooperation Agency



Integrated Development
Authority of the Liptako-
Gourma States



United Nations Office for
Project Services



United Nations
Development Program



Burkina Faso



Republic of Mali



Republic of Niger

ANNEX 1 -

PROJECT INITIATION DOCUMENT

August 2020

SUPPORT FOR RURAL ELECTRIFICATION BY RENEWABLE ENERGY SYSTEMS IN THE LIPTAKO-GOURMA REGION - Pilot Phase

Financed by: Swedish International Development Cooperation Agency

A project of: Integrated Development Authority of the Liptako-Gourma States

ID and name

22144

Projet d'Electrification Rurale dans la région du
Liptako-Gourma – Phase pilote

Office	SNOH	Ouagadougou, Burkina-Faso
Document status	Draft Final	

Table of Contents

1	Project summary	5
2	Context and justification of the project	6
2.1	Background	6
2.1.1	Economic and social context of the Liptako-Gourma region	6
2.1.2	Presentation of ALG and origins of the project	7
2.1.3	Regional and national contexts and strategies	8
2.1.3.1	Regional context	8
2.1.3.2	National contexts	8
a.	Burkina Faso	8
b.	Mali	10
c.	Niger	12
2.1.4	Strategic objectives of SIDA	14
2.2	Project justification	15
2.3	Project objectives	16
2.4	Coordination with the United Nations in the Sahel	16
2.5	Expected impacts	18
2.6	Problems and opportunities	18
2.7	Renewable energy based mini-grids: Lessons learned	20
2.7.1	Lessons learned in other countries	20
2.7.2	Lessons learned from UNOPS RREP	21
3	Implementation strategy	21
3.1	Intervention strategy	21
3.2	Scope of intervention	23
3.2.1	Structure of the project's components, activities and outputs	23
3.2.2	Roles and responsibilities	26
3.2.3	Sites selection	27
3.2.4	Hypothesis	28
3.2.5	Constraints	28
3.2.6	Exclusions	28
3.3	Institutional anchorage	28
3.4	Stakeholders analysis	30
4	Approach and implementation methodology	32
4.1	Work Breakdown Structure (WBS)	32

4.2	Implementation approach	33
4.2.1	Project Initiation and Gender analysis and action plan	33
4.2.2	Component 1 – Institutional Support	33
4.2.3	Component 2 – Installation of off-grid power supply solutions	36
4.2.4	Component 3 – Support for the improvement of the regulatory frameworks	38
4.2.5	Component 4 – Support the development of local private sector in the domain of renewable energy mini-grids	40
4.2.6	Component 5 – Support for the development of revenue-generating activities in the cross-border regions of Liptako-Gourma	41
4.2.7	Defect notification period, results monitoring and project closure	42
4.3	Project governance	43
4.3.1	Steering Committee	43
4.3.2	Technical Committees	43
4.4	Risk management	45
4.4.1	Introduction	45
4.4.2	Main risks identified	45
4.4.3	Risk management procedure	46
4.4.4	Tools and techniques	47
4.4.5	Security situation and foreseen mitigation measures	47
4.4.6	Focus on UNOPS policy to address fraud and corruption	47
4.5	Sustainability management	49
4.5.1	National ownership, exit strategy and capacity building	49
4.5.2	Development of income-generating activities	49
4.5.3	Gender	50
4.5.4	Environment	50
4.5.5	Project health and safety plan	51
4.6	Quality management	51
4.6.1	Introduction	51
4.6.2	Quality management procedures	51
4.6.3	Tools and techniques	51
4.6.4	Calendar of quality management activities	51
4.7	Structure of the project team	52
5	Provisional schedule, including tentative disbursement schedule	53
6	Budget and legal arrangements	54

6.1	Budget	54
6.2	Legal arrangements	54
7	Appendices	55
A.	Theory of change	55
B.	Relevant indicators from ALG study	58
C.	Policy and regulatory frameworks, institutional structures and baseline of programmes and projects on access to clean energy in rural areas in the three countries	59
(1)	Burkina Faso	59
a.	Policy and regulatory framework	59
b.	Institutional structure	59
c.	Baseline of programmes and projects on access to clean energy in rural areas	60
(2)	Mali	63
a.	Energy policy and regulatory framework	63
b.	Institutional structure	64
c.	Baseline of programmes and projects on access to clean energy in rural areas	64
(3)	Niger	67
a.	Energy policy and regulatory framework	67
b.	Institutional structure	68
c.	Baseline of programmes and projects on access to clean energy in rural areas	68
D.	Lessons learned	72
E.	Potential intervention areas	76
F.	Project results framework	77

1 Project summary

Project Title	Support for rural electrification by renewable energy systems in the Liptako-Gourma region - Pilot Phase
Beneficiaries	<p>Direct beneficiaries: Up to 330,000 people (including at least 30% women)¹ in the pilot project implementation areas²</p> <p>Indirect beneficiaries: Integrated Development Authority of the Liptako-Gourma States (ALG), Ministries of Energy of Burkina Faso, Mali and Niger, Burkinabe Rural Electrification Agency, Malian Rural Electrification Development Agency, Niger Rural Electrification Promotion Agency, Renewable Energy Agencies in Burkina Faso, Mali and Niger, Power Sector Regulatory Authorities in Burkina Faso, Mali and Niger</p>
Overall objective	Contribute to the economic and social development of communities in the Liptako-Gourma region through reliable and sustainable access to clean energy in rural areas
Specific objectives	<ol style="list-style-type: none"> 1. Provide clean, reliable and sustainable rural off-grid electrification solutions in targeted rural areas of the Liptako-Gourma region; 2. Participate in the socio-economic development of local communities through the development of productive activities supported by the energy infrastructures; 3. Support the establishment of an enabling environment, including regulatory and legislative environment, conducive to the development of renewable energy, mini-grids and private sector investment in this domain in all three countries; 4. Support ALG in coordinating the efforts of the three countries to promote renewable energy and sustainable rural electrification.
Impacts	<ol style="list-style-type: none"> 1. Poverty reduction and improvement of the quality of life in rural areas 2. Reduction of CO2 emissions 3. Improvement of women's living and working conditions 4. Reduction of the potential for conflict 5. Job creation and development of economic opportunities for communities in the targeted areas 6. Improved sanitary conditions 7. Improved conditions for education and learning 8. Improved regulatory and legislative environment across all three (3) countries, opening further opportunities for investment in energy infrastructures 9. Increased involvement of the private sector in rural electrification in the three (3) countries 10. Strengthened national, regional and local institutional capacities
Location	Liptako-Gourma region in Burkina Faso, Mali and Niger
Budget	8 498 746 USD
Duration of the project	37 months
Implementing partners	UNOPS, UNDP, in support of the Liptako-Gourma Region Integrated Development Authority (ALG)

¹ Estimates based on projected installed capacity, including populations in neighbouring rural communities eligible for services (schools, health posts, shops, etc.)

² Exact number of beneficiaries will be specified after site selection

2 Context and justification of the project

2.1 Background

2.1.1 Economic and social context of the Liptako-Gourma region

The Liptako-Gourma region is the common border area of Burkina Faso, Mali and Niger, covering an estimated 370,000 km².³ It includes eight regions of Burkina Faso (Centre, Centre-Est, Centre-Sud, Centre-Nord, Est, Plateau Central, Nord, Sahel), six regions of Mali (Mopti, Tombouctou, Gao, Kidal, Ménaka and Taoudéni), and two regions in Niger (Tillabéri and Dosso), in addition to the urban community of Niamey; for an estimated population of 17,000,000 inhabitants. The Liptako-Gourma region is rich in natural resources. It is crossed by the Niger River for 1,400 km and contains reserves of manganese, phosphate, iron and gold, among others.

The region has generally low literacy and enrolment rates, particularly in border areas. This situation is exacerbated by insecurity with the closure of about 1,000 schools in the area in 2018. Furthermore, these areas face a low or insufficient presence of public services (health, education, security, etc.) compared to the rest of the regions of the three countries. This contributes to a high level of infant and child mortality, particularly in the face of the expansion of cross-border epidemics (meningitis, measles, and cholera, which are frequently recorded).

The region is experiencing strong demographic growth (between 3% and 4% per year) marked by a large young population (50% of the cross-border population are under 15 years of age).⁴ This young population remains particularly affected by unemployment due to a poorly diversified local economy, mainly focused on agriculture and livestock, and livelihoods vulnerable to climate change. This context places young people in a situation of economic and financial insecurity, exposing them to recruitment by extremist religious groups and other organized criminal groups, or to illegal activities and trafficking. Beyond destroying self-confidence, this condition of economic and financial insecurity is a real obstacle to the participation of young people - as development agents - in the local economy.

This situation is exacerbated for women. While Burkina Faso, Mali and Niger have ratified the international legal instruments that recognise equality between men and women, as well as the right not to be discriminated against on the ground of gender, many obstacles remain to the effective transposition of these provisions into national legislation and their implementation⁵. Strong resistance from certain social leaders in the past years have prevented the Central Sahel countries from effectively reforming their family codes to make them more gender sensitive and gender balanced, although some positive discrimination measures have been established to promote women in political leadership roles. In practice, this attempt to change “the norm” is coming up against major economic, social and cultural barriers that continue to marginalise the role of Sahelian women in decision-making processes. In many Central Sahel communities, daily life is ruled by customary laws and social norms that are often deeply discriminatory against women. This situation, particularly prevalent in terms of access to inheritance, property or education, inhibits women’s opportunities to effectively participate in the local economy and exacerbates their vulnerability. Girls dropping out of school early is also inextricably linked to the phenomenon of early marriage, which is widespread in the region, as are other forms of gender-based violence. Niger ranks highest in the world for child marriage, with 76% of girls being married before they reach adulthood.

³ Source: ALG

⁴ Source: R-CAP Resilience Common Analysis and Prioritization, December 2018

⁵ Dogmatism or pragmatism? Violent extremism and gender in the central Sahel, L. Raineri, 2020 (<https://reliefweb.int/report/burkina-faso/dogmatism-or-pragmatism-violent-extremism-and-gender-central-sahel>).

The Liptako-Gourma region is now the epicentre of the security crisis in the Sahel with many armed groups operating on the borders of the three countries; notably Katiba Macina, Ansar Diine, the Islamic State in the Great Sahara, among others. These armed groups take advantage of the porous borders and the vulnerability of local communities, which are often exploited, creating additional community tensions. The low level of development in the areas where these armed groups are located facilitates the instrumentalization of local populations. Gender is an important factor for roles of engagement in conflict and peacebuilding processes. While they suffer elevated levels of conflict-related gender-based violence, women also play key roles as informants for insurgent groups and exert significant influence over security decisions in the private sphere⁶.

People in these areas often travel long distances to the nearest urban areas to access electricity. Students often use firewood or flashlights to learn or review lessons. Health centres also face enormous difficulties in the provision of health services and childbirth, as they lack electricity. In addition, the storage of some pharmaceutical products (vaccines and sera) is difficult due to the lack of a reliable cold chain. Thus, reliable access to electricity through renewable energy sources would constitute a demonstrable added value for strengthening community access to basic services (education, health, development of economic opportunities, etc.) and in the fight against rural-urban migration.

2.1.2 Presentation of ALG and origins of the project

On 3 December 1970, the three (3) States sharing the Liptako-Gourma Region created an intergovernmental body called the "Integrated Development Authority of the Liptako-Gourma Region (ALG)" with the mission of promoting the integrated and harmonious development of the aforementioned region. ALG has set itself the objective of jointly promoting within a regional framework the promotion and development of mining, energy, water, agricultural, pastoral and fishing resources within its area of intervention. With the enlargement decided by the Heads of State on 24 January 2017 of its fields of intervention to include security, ALG has become an organization for development and security cooperation with a dual mission:

- To contribute to the development of the economies of Member States through the concerted development of their mineral, energy, water, pastoral and pisciculture resources and through the joint construction of development infrastructures;
- To develop and implement an appropriate strategy that responds to security challenges in Member States.

The headquarters of ALG is located in Ouagadougou, Burkina Faso, and its name is changed to "Autorité de développement intégré des Etats du Liptako-Gourma (ALG)".

As part of the implementation of its renewable energy program in the Liptako-Gourma region, ALG carried out a technical and economic feasibility study financed by the Arab Bank for African Development (BADEA) between 2017 and 2018 for the electrification of three hundred (300) localities in the three countries (100 localities per country). Thanks to the cooperation between ALG and Sweden initiated in November 2018, following the visit of the Swedish authorities to the Institution's headquarters and exchanges with the Executive Secretary of ALG, the Swedish International Development Cooperation Agency (SIDA) has expressed its interest in the implementation of this project, which aims mainly at electrifying rural areas in all three countries.

The border areas of Liptako-Gourma are among the Sahel regions with one of the greatest renewable energy potentials, particularly for solar and wind energy. According to the United Nations Support Plan for the Sahel and based on 2016 data, the region's solar energy potential translates into approximately

⁶ 'Hand in Hand': A Study of Insecurity and Gender in Mali, G. Chauzal, Z. Gorman, SIPRI, 2019 (https://www.sipri.org/sites/default/files/2019-12/sipriinsight1912_6.pdf).

13.9 billion GWh/year compared to global electricity consumption of 20 million GWh/year. However, the average electricity rate in the Sahel is only 41%, and drops to 14% in rural areas⁷.

2.1.3 Regional and national contexts and strategies

2.1.3.1 Regional context

Burkina Faso, Mali and Niger are also members of the Economic Community of West African States (ECOWAS). The organization works with its 15 Member States and international partners on economic development in priority sectors, including the improvement of energy production, distribution and consumption within the region. As ECOWAS members, Burkina Faso, Mali and Niger form part of the ECOWAS Energy Protocol that was adopted in 2003; this is a legal framework that aims to promote long-term cooperation based on building relationships that are mutually beneficial to increase energy sector investment in the region. In terms of trade, the ECOWAS Energy Protocol provides for, among its other principles, third party access to the grid and a right to the transit of energy.

In 2013, the ECOWAS Heads of States adopted the ECOWAS Renewable Energy Policy and the ECOWAS Energy Efficiency Policy. The ECOWAS Renewable Energy Policy set a target of 19% renewable energy in the region's overall electricity mix in 2030 (48% including large hydro). In addition, the Policy set the objective that 25% of the rural ECOWAS population is to be served by mini-grids and stand-alone systems by 2030.

The ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE), established in 2008, developed these policies and provides significant technical assistance to the ECOWAS members. In Mali, for instance, ECREEE has supported the government in undertaking pre-feasibility studies for rural electrification in 97 villages, and in developing a BOOT (Build-Own-Operate-Transfer) model tender for the development of grid-connected renewable energy projects.

It is important to note that in 2015, ECOWAS adopted the ECOWAS Policy for Gender Mainstreaming in Energy Access⁸ which was developed with the support of ECREEE and was at the time described as “revolutionary” by the ECOWAS Commissioner for Energy. The goal of the ECOWAS Policy for Gender Mainstreaming in Energy Access is to address existing barriers that may hinder the equal participation of women and men in expanding energy access in West Africa and, by extension, the success of the SE4ALL initiative and the ECOWAS Regional Policies on Renewable Energy and Energy Efficiency.

The national utilities of Burkina Faso, Mali and Niger are also members of the West African Power Pool (WAPP), a specialized ECOWAS institution established in 1999 with the aim of harmonizing national electricity systems within the region and delivering power in a stable, reliable and cost-competitive manner.

Burkina Faso, Mali and Niger are also members of the West African Economic Monetary Union (UEMOA), along with five other West African countries. UEMOA's objective is to reach 82% of electricity from renewables, including large hydropower, by 2030. UEMOA has carried out an installation study for large solar power plants, identifying five sites - which include Mali - for a total capacity of 574 megawatts (MW), to be commissioned by 2030.

Burkina Faso, Mali and Niger also form part of the Permanent Interstate Committee for Drought Control in the Sahel (CILSS), which brings together 13 countries within the Sudano-Sahelian zone. Under the regional solar programme of CILSS started in 2003, an important number of solar water pumps and solar home systems have been installed in the member countries.

⁷ Source: Tracking SDG7: Country Profiles, ESMAP, 2017, <https://trackingsdg7.esmap.org/countries>

⁸ <http://www.ecreee.org/news/member-states-endorse-ecowas-policy-gender-mainstreaming-energy-access>

2.1.3.2 National contexts

a. Burkina Faso

Burkina Faso, with an area of 274,200 km², is a low-income, landlocked Sub-Saharan country at the heart of the Sahel strip between Mali, Niger, Côte d'Ivoire, Ghana, Togo and Benin. Its population, growing at an average annual rate of 3.1%, was estimated at 19.7 million inhabitants in 2016⁹. Burkina Faso has important mining (gold, copper, iron, manganese, etc.) and agricultural resources. Cotton is its second largest export item, with a total export value of USD 198.7 million in 2017. The economy is heavily reliant on agriculture, with close to 80% of the active population employed in the sector.

The poverty rate in the country has been declining from 55.3% in 2009 to 43.7% in 2014, but remains high, especially in rural areas. 90% of people below the poverty line in Burkina Faso live in rural areas. This rural predominance of poverty originates from prevailing inequalities in terms of illiteracy, gender and lack of basic infrastructure. Rural communities live mainly on subsistence agriculture, which does not generate any surplus and is highly vulnerable to climate change. The Gender Development Index of 0.875 in 2018 shows that women did not equally benefit from the country development progress, and the country ranks 147th out of 162 countries with a score of 0.612 for its Gender Inequality Index¹⁰. Since the political crisis of 2014, the security situation has deteriorated significantly, particularly in the border regions with Mali and Niger. The fragile security situation in northern Mali has been a major factor in this instability. Faced with porous borders, attacks have increased in number, mainly targeting the Burkinabe defence and security forces. These attacks, in addition to community tensions, make some areas of the country very unstable and difficult to access. In response to this situation, security has been strengthened, particularly in and around the capital Ouagadougou.

In the energy sector, Burkina Faso's context is characterised by a predominance of biomass energy use representing 80% of the primary energy consumption. In rural areas, the main energy source is the utilisation of traditional biomass (i.e. fuelwood, charcoal, agricultural residues, and animal dung). 2013 statistical data revealed that male-headed households have a wider access to energy (85.2%) compared to 82.4% for female-headed households. As a result, the energy availability crisis forces millions of people to resort to traditional biomass resulting in a health crisis with high levels of deaths resulting from pneumonia, chronic obstructive pulmonary disease and lung cancer. An ECOWAS study shows that Burkina is among the countries with the highest number of annual adult deaths due to chronic obstructive pulmonary disease in West Africa (1,200 cases) and number of death of children under 5 years (15,300). Biomass is mostly used for domestic cooking, where women predominate. Data on national time schedules in West Africa shows that women spend between 2 and 35 times more minutes per day on domestic cooking activities than the rest of the household members¹¹.

Burkina Faso is one of the least electrified countries globally, at 14% of the overall population in 2018, with 62% in urban areas and only about 4 to 5% of the rural population connected to electricity¹². Energy access for micro and small enterprises is only 10.5% in urban areas and 1% in rural areas¹³. Further, it has some of the most expensive electricity in the region, with cost of production (mainly thermal power) at USD 0.22- 0.25/kWh. SONABEL, the national utility, has been relying on subsidies for several years to recover costs as the tariffs alone (USD 0.13-0.17/kWh) do not recover costs. In November 2017, the 33MW Zagtouli Solar Power Station near Ouagadougou was connected to the grid, contributing about 5% to the national electricity production at production costs of 6

⁹ Source: World Bank

¹⁰ http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/BFA.pdf

¹¹ Yeleen Rural Electrification Project in Burkina Faso, Gender Assessment, Green Climate Fund, 2019 (<https://www.greenclimate.fund/sites/default/files/document/gender-assessment-fo093-afdb-burkina-faso.pdf>)

¹² Sources: Tracking SDG7, 2018, <https://trackingsdg7.esmap.org/country/burkina-faso>:

<https://donnees.banquemondiale.org/indicateur/EG.ELC.ACCS.RU.ZS?locations=SN-NE-ML-BF>.

¹³ Source: UNDP Burkina Faso data.

US-cent/kWh¹⁴. This illustrates the cost competitiveness of solar energy in Burkina Faso, a country that has abundant solar insolation.

The electricity supply consists of 6.4% renewable energy (mostly hydropower), 62.9% diesel oil production and 30.7% imported energy from its neighbours Ghana, Togo and Côte d'Ivoire. The entirety of fossil fuels consumed is imported. Growth in electricity demand has generally outstripped centralized production capacity. The electricity gap has been increasingly met from a combination of solar PV-battery and hybrid (solar-diesel) mini-grids¹⁵. These mini-grids are typically owned by consumer cooperatives (COOPEL) that have limited technical capacities. Consequently, external technical expertise is sought to operate the mini-grids¹⁶. Currently, the mini-grid electricity tariff is levelized with on-grid tariffs set by the regulator (Autorité de Régulation du Sous-secteur de l'Electricité, ARSE) thereby constraining private mini-grid development¹⁷.

Burkina Faso has a significant potential for renewable energy development, in particular solar. Hydropower generation has limited potential mainly due to the irregular precipitation pattern. Wind energy does not appear as an advantageous form of renewable energy for Burkina Faso, given the low wind speeds. There have been, nonetheless, some studies suggesting relatively higher wind energy potential in Dori, in the Sahel region¹⁸. However, in that specific region, the solar potential is higher than the average (1,650 kWh/kWp) and comparatively 2.3 times higher than wind potential (700 kWh/kWp)¹⁹. The country has a strong solar potential of 5.5 kWh/m²/day, with more than 3,000 hours of sunshine in the year favourable to the deployment of solar energy.

Burkina Faso, through its National Economic and Social Development Plan (PNDES) 2016-2020, has made electrification one of its priorities. The PNDES is part of a dynamic of structural transformation of the Burkinabe economy, around a vision of a Burkina Faso "democratic, united and in solidarity united, transforming the structure of its economy to achieve strong and inclusive growth, through sustainable consumption and production patterns". It is divided into three strategic areas: (i) Axis 1: reform institutions and modernize administration, (ii) Axis 2: develop human capital and (iii) Axis 3: boost promising sectors for the economy and jobs. Thus, this project will contribute to the achievement of the objectives of the PNDES in its Axis 2 on human capital development. It will participate directly in Strategic Objective 2.5 - improving the living environment, access to water, sanitation and quality energy services; and indirectly to Strategic Objectives 2.1 - promoting population health and accelerating demographic transition, 2.2 - increasing the supply and improving the quality of education, higher education and training in line with the needs of the economy, and 2.4 - promoting decent employment and social protection for all, especially for youth and women.

Further information on the policy and regulatory framework, institutional structure and baseline of programmes and projects on access to clean energy in rural areas in Burkina Faso can be found in Appendix C.

b. Mali

Mali is a vast Sahelian State of 1,241,238 km², of which 51% consists of desert land and 4% of cultivated land. The country, which borders Algeria, Burkina Faso, Côte d'Ivoire, Guinea, Mauritania,

¹⁴ Source: https://energypedia.info/wiki/Burkina_Faso_Energy_Situation - accessed 16 September 2019.

¹⁵ Preliminary baseline investigation conducted in the scope of the UNDP/GEF Africa mini-grids programme (<https://www.thegef.org/project/gef-7-africa-minigrids-program>) has revealed that there were approximately 45 mini-grids in Burkina Faso with 20 being solar PV-battery mini-grids and 25 hybrids. The mini-grids are less than 120 kW installed solar capacity.

¹⁶ Expertise is provided by 'fermiers' with or without contractual agreements in place. In some case, the 'fermiers' are seasonal volunteers.

¹⁷ The AfDB-implemented GEF project Yeleen Rural Electrification Project has proposed to cap minigrid tariff at \$0.4/kWh for all sectors, which is indicated by local authorities as a maximum level for privately owned mini-grids.

¹⁸ Source: Du O, Landry ASOM, Ouedraogo Y, Gagnon Y, Ouedraogo A, Universit U, et al. Atlas éolien du Burkina Faso. Ouagadougou, Burkina Faso: 'Université de Moncton, Canada & Université de Ouagadougou, Burkina Faso; 2011.

¹⁹ Source: Moner-Girona, M., Bódis, K., Korgo, B., Huld, T., Kougias, I., Pinedo-Pascua, I., Monforti-Ferrario, F. and Szabó, S., Mapping the least-cost option for rural electrification in Burkina Faso - Scaling-up renewable energies, Publications Office of the European Union, 2017, EUR 28514 EN, doi:10.2760/900097, JRC102198

Niger and Senegal, is rich in mining (gold) and agricultural resources (cotton, cereals). The population of Mali is estimated at about 19 million in 2018, with a growth rate at 3.4% per year. 62.5% of the population lives in rural areas, while the urban population is concentrated in the regional capitals as well as the District of Bamako, a city of over 4.3 million inhabitants in 2018.

Mali is one of the poorest countries in the world, with a gross domestic product of USD 15.29 billion in 2017, which translates to only USD 825 per capita. On average, agriculture and services account for approximately 80% of Mali's gross domestic product; although final energy consumption for both sectors remains below 8%²⁰. Mali had a Gender Development Index of 0.811 and a Gender Inequality Index of 0.678 in 2017, lower than both Burkina Faso and Niger²¹.

Mali has experienced many episodes of instability in its recent history. Since the political crisis of 2012 and the attempt to separate the north, the country has been facing difficulties with many armed groups operating in the territory, particularly in the northern border close to Niger and in the centre. Poverty and low economic development in these regions, in addition to community tensions, strengthen the recruitment and nuisance capacities of these groups.

Existing gender analysis in the energy sector have shown that the weak economic power of women and weak access to electricity, particularly in rural areas, has important consequences for their access to factors of production, their economic empowerment, etc. Rural women's capacities are severely constrained by low access to energy technologies and services and they use traditional biomass (wood, agricultural residues, animal excrement) for cooking food and small artisanal processing of products. They generally have little information on the opportunities offered by the use of energy sources to modernize their income-generating activities. Rural women and girls are especially affected and the major gender challenges include (i) advocacy for a favourable institutional environment ; (ii) masculinity perspective (men's awareness and involvement for women's access to opportunity) ; (iii) women's access to project decision-making during implementation ; (iv) women's entrepreneurship capacity building (access to renewable energy technologies) ; and (v) taking discriminatory measures in favour of women to ensure equity in the equipment endowment²².

In the energy sector, 76% of Mali's primary energy use consists of biomass, followed by 20% for hydrocarbon imports and 4% for electricity. Biomass (wood and charcoal) is mainly used as cooking or heating fuels in the residential sector, leading to a significant pressure on the country's forests, and contributing to land degradation.

Mali is a landlocked country without fossil fuel on its territory. Therefore, the country imports 100% of its petroleum products essentially by road from Benin (45%), Senegal (30%) and Togo (15%)²³. Mali is therefore highly vulnerable to the hydrocarbon price volatility on the international market, as well as to the stability of the neighbouring countries. There are, nevertheless, unproven oil reserves that await extensive exploration in the northern and eastern parts of the country.

The electrification rate for the population in Mali was 51% overall, and 25% in rural areas in 2018²⁴.

On-grid electricity is mainly produced by hydroelectric plants, particularly the Manantali dam (out of which 104 MW of the total of 200 MW belongs to Mali) and the Sélingué dam (46 MW), and thermal plants. Over 10 years from 2005 to 2015, the contribution of hydropower in the energy mix dropped from 80% to 45% while the contribution of thermal plants doubled to 41%. This is partly explained by hydrological changes and a progressive decrease in rainfall that negatively impacted hydroelectric production, leading to a higher reliance on oil-based production.

²⁰ Source: <https://www.irena.org/publications/2019/Sep/Renewables-Readiness-Assessment-Mali>

²¹ <http://hdr.undp.org/sites/default/files/Country-Profiles/MLI.pdf>

²² Mali solar rural electrification project, Gender Assessment, Green Climate Fund, 2019 (<https://www.greenclimate.fund/sites/default/files/document/gender-assessment-fp102-board-mali.pdf>).

²³ Source: ONAP, 2017

²⁴ Source: Tracking SDG7, 2018, <https://trackingsdg7.esmap.org/country/mali>.

Off-network electricity is mainly produced by local energy service providers in rural areas. In 2015, there were 160 isolated mini-grids in Mali, mostly diesel powered. Out of a total installed capacity of 23MW, 2MWp were supplied by solar PV. The tariffs applied by mini-grids operators are typically inadequate for households, as they reflect the high price of fossil fuel and its transportation to rural areas²⁵.

According to IRENA, Mali is endowed with a large spectrum of renewables, including sustainable biomass if adequately managed²⁶. Hydropower also still has a considerable untapped potential, subject to further studies, but is more vulnerable to climate change impacts. Solar energy, particularly solar PV, has the most potential, with an average solar radiation estimated at 5-7 kWh/m²/day for a daily sunshine duration of 7 to 10 hours. Thus, the production potential from solar PV is estimated at 7906 TWh/year.

As of early 2020, current installed renewable energy capacity beyond large hydropower is negligible, despite the existence of hybrid PV/diesel systems. However, major grid-connected PV power plants are under construction, in particular a 50MW solar PV plant in the Kita District²⁷.

The country has developed the Strategic Framework for Economic Recovery and Sustainable Development 2019-2023, aiming at “a well-governed Mali, where the harmonious coexistence of the various components of society is restored, peace consolidated and collective and individual security ensured in unity, cohesion and diversity, where the process of wealth creation is inclusive and respectful of the environment and where human capital is developed for the benefit of young people and women in particular”²⁸. That national strategy is structured around five (5) main pillars: (i) consolidation of democracy and better governance, (ii) restoring peace, security and strengthening living together, (iii) inclusive growth and structural transformation of the economy, (iv) protecting the environment and building resilience to climate change, and (v) human capital development. Directly and indirectly, the project is going to participate in achieving each of these five (5) pillars. Moreover, Mali has developed a National Renewable Energy Action Plan to increase the share of renewable energy in energy production and promote rural electrification through renewable energy, among other things. The Plan’s objective by 2030 is to have 66.64% of the rural population served by off-grid systems (mini grids and autonomous systems) of renewable energy-based electricity services²⁹. This project will also contribute to the achievement of this objective.

Further information on the policy and regulatory framework, institutional structure and baseline of programmes and projects on access to clean energy in rural areas in Mali can be found in Appendix C.

c. Niger

Niger, with an area of 1,267,000 km² (22nd largest in the world) and a population of 22.7 million (2020), is a landlocked Sahelian country with significant natural resources, including uranium, coal and oil. The country’s poverty rate was estimated at 44.1% and the average income per capita at USD 420 in 2018.

Niger’s economy is dominated by agriculture, livestock, fishing and forestry, which contributed over 43% of gross domestic product in 2018 and employs about 85% of the country’s workforce. Three quarters of Niger’s land area is desert and agriculture is mainly concentrated in the southern part of the country. The high sensitivity of the agricultural sector to increasing climate change and climate variability combined with high poverty rates are the main sources of Niger’s vulnerability to food

²⁵ Source: <https://www.greenclimate.fund/sites/default/files/document/funding-proposal-fp102-boad-mali.pdf>

²⁶ Source: <https://www.irena.org/publications/2019/Sep/Renewables-Readiness-Assessment-Mali>

²⁷ Source: <https://www.akuoenergy.com/en/kita>

²⁸ Source: Strategic Framework for Economic Recovery and Sustainable Development 2019-2023

²⁹ Source: Mali National Action Plan for Renewable Energies

insecurity and malnutrition. Niger's unemployment rate (17%)³⁰ is six times higher among women (28.9%) than men (4.4%). Young people aged 15-24 account for 19.36%³¹ (of whom 50.6% are female) of the total population, more than 80% of whom live in rural areas with an estimated employment rate of 34%³². The Nigerien government continues its attempts to diversify the economy through increased oil production and mining projects. Although Niger has sizable reserves of oil, the prolonged drop in oil prices has reduced profitability.

Niger's energy balance is dominated by biomass, which represents 79% of total energy consumption and meets 83% of household energy needs, followed by petroleum products (18%) and mineral coal for electricity generation (3%). Renewables other than biomass remain negligible at less than 1%.

Electricity access and quality constitute key challenges for Niger. The electrification rate was 18% in 2018, with a sharp difference between access to electricity for population in urban areas (48%) and in rural areas (12%)³³. The existing power infrastructure is underdeveloped, and the country continues to rely heavily on imported electricity from neighbouring Nigeria. Niger has been importing electricity at a very low price, which has historically served as a disincentive to building its own generation capacity. Load shedding and blackouts are as commonplace in Niger as in Nigeria, prompting most businesses and urban households to invest in diesel generators as backup power sources.

Domestic generation is based mainly on costly oil fuels (98%). Nationwide aggregated installed capacity is only about 177 MW, serving 360,000 customers. About 130 MW is located in the Western grid (Niamey, Tillabéri, Dosso). The Nigerien Electricity Company (NIGELEC) owns all grid infrastructure and operates 110 diesel-powered mini-grids to expand rural electrification³⁴. NIGELEC owns and operates approximately 50% of the current installed capacity. The other 50% is owned by four independent power producers (IPPs). Industry (especially mining) uses approximately half of the installed capacity, meaning that the capacity to serve consumers is constrained, thereby increasing reliance on imports from Nigeria.

In Niger, electricity demand is growing at a faster pace than the GDP. Over 2001–2015, electricity demand grew at 16% per year, much faster than the GDP growth of about 4%; and it was expected to grow more than 10% per year during 2015–2020, albeit from a very low consumption base. These are among the highest growth rates for electricity demand in the world and is partly attributed to the high rate of population growth and low baseline.

In order to address the generation gap, the Government of Niger has developed an ambitious generation plan for 2016–2027 with major power generation and transmission investments to enable expansion of electricity services. The plan considers short-term supply domestic options at high generation cost (diesel/heavy fuel oil in the absence of additional transmission capacity for imports), while cheaper options (hydro, coal, solar, or additional imports from Nigeria) become available in the medium and long run³⁵. Four major projects constitute the main pillar of the plan:

- Gorou Banda diesel power plant (100 MW in 2020);
- Kandadji hydroelectric plant (130 MW by 2023) supported by the World Bank;
- Sakaldamna coal power plant (200 MW up to 600 MW by 2023) likely financed by the private sector through an Independent Power Producer (IPP); and
- a new 330 kV double circuit interconnection line with the West African Power Pool (WAPP) to increase imports from Nigeria (400 MW by 2024), as part of the North Core/Dorsal Nord

³⁰ National Survey on Household Living Conditions and Agriculture, 2014

³¹ CIA World Factbook 2019

³² National Statistics Institute, tableau de bord social, 2018

³³ Source: Tracking SDG7, 2018, <https://trackingsdg7.esmap.org/country/niger>

³⁴ Source: Off-Grid Solar Market Assessment Niger, Power Africa Off-grid Project, 2019.

³⁵ Source: Electricity Access Expansion Project in Niger, Project proposal, World Bank, 2018

Regional Power Interconnector Project (P162933) supported by the World Bank and a number of donors.

Niger is endowed with significant renewable energy resources and has the potential to develop a diversified portfolio of renewable energy technologies. With improvements in technologies and costs, potential renewable energy is well suited to both urban and rural applications³⁶.

The Government of Niger has identified up to 100 MWp grid-connected solar PV for generation potential, for which the Government already secured the financing for 20 MWp at Gorou Banda (Agence Française du Développement – AFD) and 7 MWp plant at Malbaza (Exim Bank India) – both currently being developed as public projects to be owned and operated by the national utility NIGELEC. The plan also includes a site of 30 MWp at Gorou Banda (near Niamey) and four other sites of around 10 MWp each in the regions of Maradi, Zinder, Tillabéri (Lossa), and Dosso. Finally, AFD and the EU are financing a hybrid/diesel power plant of around 19 MW (13 MWp solar and 6 MW thermal) in Agadez.

Niger is facing increased security concerns on its borders from various external threats including insecurity in Libya, spill over from the conflict in Mali, and violent extremism in north-eastern Nigeria. Despite this relatively strong instability in some regions, particularly in the Tillabéri region and around Lake Chad, the country aims to become, by 2035, "a united, democratic and modern country, peaceful, prosperous and proud of its cultural values, underpinned by sustainable, ethical, equitable and balanced development, in a united and supportive Africa"³⁷. Thus, the country's Economic and Social Development Plan 2017 - 2021 is structured around five axes: (i) Axis 1 - Cultural Renaissance, (ii) Axis 2 - Social Development and Demographic Transition, (iii) Axis 3 - Accelerating Economic Growth, (iv) Axis 4 - Improving Governance, Peace and Security, (v) Axis 5 - Sustainable Environmental Management. The PDES also acknowledges the persisting gender inequality in the country (one of the highest in the world), in particular in terms of access to healthcare, education and economic opportunities³⁸. The achievement of the ESDP objectives requires the development of rural electrification and renewable energy. Thus, this project will directly contribute to the development of energy infrastructures³⁹, the development of rural electrification⁴⁰, the promotion of economic activities in the targeted regions⁴¹, and the strengthening of the legal framework for business⁴². It will also indirectly contribute to ensuring the supply and quality of education and training⁴³, improving the supply, quality and demand for health services⁴⁴, ensuring universal and equitable access to safe drinking water at an affordable cost⁴⁵, among others.

Further information on the policy and regulatory framework, institutional structure and baseline of programmes and projects on access to clean energy in rural areas in Niger can be found in Appendix C.

2.1.4 Strategic objectives of SIDA

SIDA gives particular importance to sustainable social development through access to clean and sustainable energy⁴⁶. As part of its strategy for sub-Saharan Africa 2016-2021, SIDA's support to the

³⁶ Source: Niger Renewables Readiness Assessment, IRENA, 2013.

³⁷ Niger Social and Economic Development Plan (PDES)

³⁸ Plan de Développement Économique et Social 2017-2021, République du Niger, Ministère du Plan, 2017

(<https://www.undp.org/content/dam/niger/docs/UNDP-NE-PDES%202017-2021.pdf>).

³⁹ PDES, Subprogram 5.3 : Development of economic infrastructures

⁴⁰ PDES, Subprogram 6.3 : Development of rural infrastructures and services

⁴¹ PDES, Subprogram 9.4 : Promotion of peace and security development initiatives

⁴² PDES, Subprogram 5.6 : Improvement of the business environment

⁴³ PDES, Subprogram 3.1: Improvement of the population's level of education and training

⁴⁴ PDES, Subprogram 3.2: Improving the health status of the population

⁴⁵ PDES, Subprogram 3.4: Capacity building for drinking water management

⁴⁶ Source : <https://www.sida.se/English/how-we-work/our-fields-of-work/sustainable-societal-development/Sustainable-energy/>

energy sector focuses on the development and expansion of sustainable energy systems, the increased use of renewable energy, energy optimization and new technologies. The objective is to improve the standard of living of people experiencing poverty by providing them with access to energy, a prerequisite and an important factor for social and economic development. SIDA also supports the establishment of appropriate institutions and regulations for the development of an efficient energy sector.

The proposed project aims, through access to sustainable energy in rural areas, to: (i) improve the living conditions of the population, (ii) increase household incomes in rural areas, and (iii) ensure sustainable development; all of which constitute a springboard towards poverty reduction. The main beneficiaries of the project will be: community services such as health centres and schools, businesses, as well as households.

It is expected that through the provision of clean, reliable and sustainable energy, the project will support the socio-economic development of rural areas; in particular, for populations not served by the national electricity grid.

2.2 Project justification

In order to support the implementation of the renewable energy program in the Liptako-Gourma region, SIDA approached UNOPS for the preparation of a concept note for the implementation of a first phase. Following this concept note, SIDA confirmed its commitment to finance a pilot phase of the Support for Rural Electrification by Renewable Energy Systems in the Liptako-Gourma Region project, implemented by UNOPS, in support of and for the benefit of ALG and the three States concerned, and in collaboration with UNDP. The decision to develop this project is also inspired from a similar initiative, the Rural Renewable Energy Project (RREP), which is currently implemented in Sierra Leone by UNOPS. Funded by the United Kingdom Department for International Development (DFID) for an amount of more than 40 million USD, the RREP aims to build 94 mini-grids and 4 autonomous systems with a strong involvement of national authorities and the private sector. The project will strengthen economic growth, improve education and health performance, and significantly reduce Sierra Leone's greenhouse gas emissions. It has a duration of four (4) years and is expected to be completed in October 2020.

Hence, the pilot phase of the Support for Rural Electrification by Renewable Energy Systems in the Liptako-Gourma Region project will be implemented by UNOPS, in collaboration with UNDP, to the benefit of ALG. The partnership between UNOPS and UNDP is due in particular to the strong presence and experience of UNDP in the West African sub-region, the involvement of UNDP in the implementation of the United Nations Sahel Plan, and the coordination of One UN actions. In addition, UNDP's experience in institutional support and support for the development of income-generating activities for targeted groups (in particular women, youth, vulnerable people) will be beneficial and will contribute to the achievement of the project's objectives. UNDP will also build on its long experience, first as the Implementing Agency of the Global Environment Facility (GEF) since 1991, but also on the basis of various projects at the country level in the region, particularly in Burkina Faso, Mali and Niger. UNDP will, as well, build on the achievements of its Regional Energy for Poverty Reduction Program (PREP), implemented in twelve (12) countries including Mali and Burkina Faso, as well as existing projects on productive energy in the three countries.

A joint ALG - UNOPS - UNDP mission was organized from July 21 to August 1 2019 to meet with the various State stakeholders as well as the local private sectors for a better understanding of national contexts and the most precise project formulation possible. Potential project implementation sites were

also visited in Niger in the Say Commune, and in Burkina Faso in the Mèguet Commune. These site visits provided all participants with a better understand of the rural context in these two countries and allowed participants to exchange with the communities on their needs and expectations.

By entrusting UNOPS with the implementation of this project in support of ALG and in collaboration with UNDP, SIDA can be reassured that the following four perspectives will be at the heart of all the action taken:

- Considerations related to poor/vulnerable people and human rights will be taken into account by involving communities from the design phase and developing income-generating activities (IGAs) for the benefit of these vulnerable populations, including women and youth. The supply of electricity through the mini-grids will make it possible to develop economic activities in the target areas and improve the standard of living and quality of life for these vulnerable populations;
- The environment and environmental impacts are key elements that are taken into account in all UNOPS projects through a well-defined approach detailed in section 4.4.1. In addition, UNDP, as an implementing agency of the GEF, supports countries in achieving their national and global environmental objectives. The experience acquired will be used and an environmental impact study will be carried out at the beginning of the project in order to ensure that the work is carried out in a way that respects the ecosystems of each site and is in line with national legislation on environmental protection;
- Gender considerations are also systematically taken into account in UNOPS and UNDP projects from the design phase to implementation. In all three countries, girls and women experience conflict differently than boys and men. In particular, the lack of access to energy sources puts girls and women into situations in which they are conducting gender-prescribed household labour in poorly-lit or unlit areas, in which they are more vulnerable to being targeted for acts of violence. Including the particular voices and opinions of women and girls in the development of this project, and doing so in ways that allow them the space to freely speak their opinion (for example, by conducting needs assessments with women and girls during times they are not expected to perform household labour; interviewing potential beneficiaries separate from the males in their families, etc.) are key to ensuring this project is gender-responsive and therefore effective across all three countries of implementation. UNOPS' approach to gender mainstreaming is detailed in section 4.4.4.4, and income-generating activities will be developed mainly for women and youth. The project will also encourage the recruitment of female workers;
- Conflict considerations are at the heart of this project, which will be implemented in a context of security instability in the Liptako-Gourma region and the Sahel as a whole. Access to electricity and the development of productive activities based on it will limit the socio-economic vulnerability of local communities and provide a real alternative to recruitment, especially of young people, into armed groups operating in the region. Through the various activities of this project, new economic opportunities will arise for local populations. The results of this project will contribute to increasing the livelihoods of these communities, thus contributing to their resilience to the effects of climate change, and to preventing and combating the proliferation and strengthening of armed groups in the Liptako-Gourma region.

2.3 Project objectives

The project to support rural electrification through renewable energy systems in the Liptako-Gourma region aims at contributing to the economic and social development of communities in the Liptako-Gourma region through reliable and sustainable access to clean energy in rural areas.

More specifically, the project has the following objectives:

- Provide clean, reliable and sustainable rural off-grid electrification solutions in targeted rural areas of the Liptako-Gourma region;
- Participate in the socio-economic development of local communities through the development of productive activities supported by the energy infrastructures, targeting in particular women and youth as key stakeholders;
- Support the establishment of a gender-responsive enabling environment, including regulatory and legislative environment, conducive to the development of renewable energy, mini-grids and private sector investment in this domain in all three countries;
- Support ALG in coordinating the efforts of the three countries to promote renewable energy and sustainable rural electrification.

In addition, the project will contribute to the achievement of Sustainable Development Goals in the three countries, including Goal 5 – Gender Equality, Goal 7 - Access to clean and affordable energy, and Goal 13 - Address climate change and its impacts. The project will also be sensitive to countries' international commitments with regard to the United Nations Secretary-General's initiative on access to energy for all (SE4ALL).

2.4 Coordination with the United Nations in the Sahel

This project is fully in line with the United Nations Support Plan for the Sahel (2018), under the umbrella of the United Nations Integrated Strategy for the Sahel (UNISS – 2013). The Support Plan, which targets 10 countries (Burkina Faso, Cameroon, Chad, Gambia, Guinea, Mali, Mauritania, Niger, Nigeria, and Senegal), aims to intensify efforts to accelerate shared prosperity and sustainable peace in the region. It highlights the potential of the Sahel and its assets in terms of natural resources, tourism and culture, and demographic dividends, among others.

The United Nations Support Plan for the Sahel is structured around the following six priority areas:

- i. Promoting cross-border cooperation for stability and development;
- ii. Preventing and resolving conflicts; violent extremism and crime; and promoting access to justice and human rights;
- iii. Promoting inclusive and equitable growth and increasing access to basic quality services;
- iv. Building resilience to climate change, and decreasing natural resource scarcity, malnutrition and food insecurity;
- v. Promoting access to renewable energy;
- vi. Empowering women and youth for peace and development in the Sahel.

The project addresses five of these six priority areas, namely (i) promoting cross-border and regional cooperation for stability and development, (iii) promoting inclusive and equitable growth and increasing access to quality basic services, (iv) climate action, (v) promoting access to renewable energy, and (vi) empowering women and youth as peace and development guards in the Sahel.

The UN System, under the leadership of UNDP, is currently developing a UN's renewable energy programme for the Sahel in the scope of the fifth priority area of the Support Plan, "Promoting access to renewable energy". As a first step towards the elaboration of this programme, a conceptual framework was formulated in March 2020, that highlights the need to address 3 complementary levels of interventions to achieve a holistic and sustainable action:

- Level 1: Setting up enabling conditions for the sound development of renewable energy solutions;
- Level 2: Deploying sustainable energy solutions and basic services;
- Level 3: Supporting economic growth using sustainable energy.

This project is fully aligned with this framework, by addressing Level 1 in the Components 1, 3 and 4, Level 2 in the Component 2, and Level 3 in the Component 5.

In addition, this project will be implemented in close coordination with the Joint Program to support the implementation of cross-border cooperation activities in the Liptako-Gourma region. This Joint Program, also funded by SIDA, is a multisector initiative that brings together the agencies of the United Nations system, UNODC, UNOCHA, UNICEF, UNECA, UNOFEMES, ILO, UNESCO, OHCHR, UNDP, under the coordination of UNDP. It has been designed on the basis of the Program of Activities defined by ALG⁴⁷.

The overall objective of the program is to "strengthen community resilience and human security in the face of environmental and climate shocks, threats to the Sahel, including cross-border threats and the spill over effect of the Mali crisis that continues to affect peace and security in Burkina Faso and Niger". The expected results of the program are as follows:

- Result 1: Strengthened regional, national and local capacities and mechanisms in the Liptako-Gourma region for better coordination, sustained sharing of information on transboundary management;
- Result 2: Regional and national policies and strategies, legal frameworks are reviewed and harmonized for the promotion of social cohesion, good governance, conflict management, child protection, access to justice, integrating international human rights standards;
- Result 3: Improved and protected livelihoods for community food security, access to basic social services and resilience to various shocks (environmental and climate) for women, youth and vulnerable groups; their access to livelihoods and basic social services is improved.

In order to pool efforts and strengthen expected results, the Rural Electrification through Renewable Energy Systems project in the Liptako-Gourma region will support the joint program in the activities planned by the program where renewable energy needs will be identified. This coordination will concern the intervention areas, the specific activities of each component, gender considerations as well as the steering structures. Effective communication will be established with a permanent exchange of information.

2.5 Expected impacts

The implementation of the project will contribute in particular to:

1. Poverty reduction and improvement of quality of life: this impact is expected through the creation of jobs directly and indirectly related to electricity supply and through the increase of local economic cycles;
2. Reduction of CO2 emissions: this impact is expected through the application of clean energy technologies (solar PV) replacing the use of fuel/diesel generators;
3. Improvement of women's living and working conditions: women who benefit from access to electricity are expected to be impacted in the form of improved safety (through street lighting), telecommunications and information (charging mobile phones and using television/radio at home), reduced physical burden (e.g. through solar electric pumps for better access to drinking water) and new and better economic opportunities;
4. Reducing the potential for conflict: this impact is expected by providing employment opportunities for rural populations and young people in particular (including potential future and/or ex-combatants), and by giving each community member the choice to control their future by integrating into a productive society;
5. Job creation and development of economic opportunities for communities in the targeted areas: the creation of favourable conditions for the development of employment opportunities for young people will be an alternative to rural exodus and irregular migration, based on the transformation of local production through means / techniques of transformation using renewable energies;

⁴⁷ Source: Activity Plan to Support Cross-border Cooperation in the Liptako-Gourma Region

6. Improved regulatory and legislative environment across all three (3) countries, opening further opportunities for investment in energy infrastructures: conducive to investment by the private sector and other bodies;
7. Improvement of sanitary conditions: improving the health conditions of rural populations is expected through the use of electrical lighting, electrical medical equipment and refrigeration of vaccines and other pharmaceutical and zoo health products requiring a cold chain in rural health centres or rural veterinary stations, as well as health and zoo health information (television/radio);
8. Improving conditions for education and learning: improvement of educational conditions is expected through the use of electric lighting and electric teaching aids in schools, and the extension of schoolchildren's study time, as well as access to information (Internet, TV, radio);
9. Increased involvement of the private sector in rural electrification in the three (3) countries: is expected thanks to a more appealing business environment, with enhanced regulatory frameworks more beneficial to private sector investments;
10. Strengthening national, regional and local institutional capacities: through training, a study trip, and targeted advocacy.

2.6 Problems and opportunities

The development of the market for mini-grid electricity supply networks in sub-Saharan African countries is often hampered by existing policies, regulations and trade barriers. Among the main obstacles - the scope of which varies from one country to another - are the following:

- **Government policies:** The respective Ministries, as government agencies directly responsible for the development of renewable energy, are the main bodies responsible for the formulation and implementation of government policies on renewable energy and energy efficiency. In the absence of a clear policy and regulatory framework to promote private sector participation in off-grid and grid energy supply, the private sector, although willing to engage in this activity, has been reluctant to invest in modern energy services for rural areas. By putting in place a clear policy, governments will pave the way for investment in off-grid rural electrification.
The project will therefore help governments to address this specific barrier in order to pave the way for private sector investment in mini-grids and village electrification programs.
- **Institutions:** A major problem in the energy sector is the availability of data. As a result, the lack of up-to-date baseline data on energy has important implications for governments' ability to make informed decisions about the energy sector.
In response to the above-mentioned institutional obstacles, the project will support, if possible: (i) the design and implementation of a national survey on energy supply, consumption and demand, disaggregated by sector, district and application; (ii) the establishment of an energy consumption database and information system; and (iii) the implementation of energy consumption modelling software to analyse data and design different scenarios while generating the information needed to encourage the development and implementation of renewable energy projects.
- **Legislation and regulations:** Although the countries concerned have launched various initiatives to improve the general context of rural electrification and renewable energy, there are no appropriate legal and regulatory frameworks on the use of renewable energy resources and rural mini grids in these countries. This legislative gap concerns, inter alia, licensing before the construction of a mini-grid, the environmental impact studies required before licensing, the quality of service to be provided to rural customers, retail pricing to allow profitable operation, laws that govern the relationship between the national network and mini-grids and that ensure the necessary legal protection for private investment, etc. The project will support governments in identifying gaps and weaknesses in regulatory frameworks and propose measures for improvement.
- **Financing:** Discussions during the formulation mission indicated that private sector investors consider the unavailability of credit as a major obstacle to the creation of market opportunities in rural mini-grids. The high initial investment costs for renewable energy and the limited financing of projects by local banks were also highlighted. Therefore, the project will provide technical assistance to local investors to propose measures for the implementation of financial support programs that will help minimize financial risk for investors and donors.

- **Technical resources:** One of the lessons learned from many projects in the region is that many individual solar kit systems fail in the first few months after installation due to poor quality of imported equipment and auxiliary components, and poorly made installations. It is therefore necessary to ensure that only quality equipment and components are allowed to be imported and that standards are established for their installation. There is a need to put in place a mechanism to ensure that renewable energy technologies comply with internationally recognized technical standards and that these standards are applied to all purchases and installations. The project will seek to achieve this objective through collaboration with the relevant authorities and will aim to provide investors and consumers with assurance and confidence in the quality of the equipment purchased and the services received.
- **Economic and social context:** Poverty, tradition and lack of alternatives push communities and individuals to perpetuate unsustainable resource exploitation practices (e. g. cutting down shrubs that lead to soil erosion, burning manure that could otherwise be used as fertilizer). The lack of employment opportunities and viable income-generating solutions are at the root of the rural exodus. During the interviews conducted during the formulation mission, villagers expressed the need to prioritize the social and economic benefits in their villages (e.g. health and income-generating activities) as well as to improve natural resource management. The project will address these problems by providing modern energy services to promote a better quality of life and provide opportunities for the development of economic activities in the targeted areas.
- **Security Issues:** This region is now the epicentre of the security crisis in the Sahel, with many armed groups operating on the borders of the three countries; notably Katiba Macina, Ansar Diine, and the Islamic State in the Great Sahara, among others. These armed groups take advantage of the porous borders and the vulnerability of local communities, which are often exploited, creating additional community tensions. The low level of development in the areas where these armed groups are located facilitates the instrumentalization of local populations. This project will address these major issues through improved and protected livelihoods for community food security, improved and protected access to basic social services and increased resilience to various threats for women, youth and vulnerable groups, as their access to livelihoods is equally improved.
- **Awareness-raising:** In the absence of experience with privately implemented mini-renewable energy networks (in Niger and Burkina Faso), it is clear that many stakeholders have little awareness of the benefits that this technology can bring to improving rural livelihoods. In addition, this absence of experience means there is a total lack of information on best practices and lessons learned in other countries at either the local or the national levels. Once the project has started, this situation will be corrected by compiling and publishing reports, in electronic or printed form, on good practices and experience gained from the project.
- **Gendered gaps in access to energy:** Some infrastructure projects, such as rural electrification projects, do not assume that girls and women, boys and men, have different experiences of a lack of energy since they will seemingly equally benefit from the intervention. However, women, men, girls and boys have different needs and requirements for energy infrastructure. For instance, women are disproportionately responsible for unpaid domestic care work responsibilities compared to men, including household water, fuel and firewood provision. They may travel using different means and at different times. These differences may lead to harassment and gender-based violence (GBV) against women and girls if gender considerations are not incorporated into the planning and design of lighting infrastructure. A gender-responsive design should consider barriers driving inequalities, the division of household labour, particularly related to energy needs, women's safety and mobility, their priorities around energy needs in the household and particularly their ability to gain employment and therefore financial independence either working in the energy sector or by benefiting from investment in the energy sector.

Despite these problems, the project presents many opportunities, particularly for local communities, ALG and the Member States. This project provides the population with an opportunity to access energy and therefore better living conditions with more security, and a certain level of comfort (television, refrigerator, street lighting, etc.) that may now be possible, among other things. In addition, the electrification of social infrastructure such as schools and health centres/posts will help to improve the quality of education and care for sick and pregnant women. This project will boost the economies of the targeted localities and areas by offering new economic opportunities to the population. ALG and

its Member States will also benefit indirectly through the socio-economic development of the populations of the Liptako-Gourma region, increased dialogue and cooperation, and better coordination of their actions, particularly in terms of sustainable rural electrification.

2.7 Renewable energy based mini-grids: Lessons learned

2.7.1 Lessons learned in other countries

A comprehensive study entitled "Hybrid Mini-grids for Rural Electrification: Lessons Learned"⁴⁸ describes the main lessons learned related, among other things, to the private sector models that the project wishes to pursue.

A model involving the private sector can take different forms depending on the ownership of the system and the mini-grid, the type of end-user contracts and the subsidy model applied. However, the main advantage is that it generally provides electricity more efficiently than any other model. The main lessons learned are as follows:

- The deployment of mini-grids raises complex financial and organizational issues. The major obstacles to the sustainable success of mini-grids are not technological assets, but financing, management, business models, maintenance, sustainable operations and socio-economic conditions. Each community has a set of characteristics and interests that will determine the best technical solution based on local financial, social and environmental conditions;
- The operator must be at the heart of the system design and technology choice. The essential factors of the project should be cost and quality, including consumer health and the environment;
- Results-based aid grants and long-term concessions, when well designed, are attractive programs to increase private sector participation;
- A certain level of standardization of administrative procedures and the tendering process is recommended in order to achieve a reasonable degree of replication and economies of scale;
- A strong and targeted communication campaign around the call for tenders and the program is essential to increase private sector participation;
- Awareness campaigns are justified to support the development of the project on the basis that they are cheaper and more sustainable;
- Financially viable tariffs must be designed in such a way as to provide a sufficient return on investment to attract private sector investors. Private sector participation can lead to higher tariffs or subsidies in order to maintain affordable prices, but they can also lead to more efficient operation;
- The collection of payments is an important task to ensure the sustainable operation of a mini-grid. First, the payment method must be clearly defined, stated and well-advertised in advance so that all end-users are aware of expectations. Clear records must be kept by the person(s) in charge and available for review. The importance of paying the fees and the possible consequences for individuals (and the community as a whole) for anyone who modifies the meter or does not pay must be clearly explained.

2.7.2 Lessons learned from UNOPS RREP

The Rural Renewable Energy Project (RREP) funded by DFID and implemented by UNOPS in close collaboration with the Sierra Leone Ministry of Energy, aims to accelerate electrification through mini-grids in areas and localities that are beyond the reach of Sierra Leone's national grid. The RREP is based on a strategy of participation and active involvement of the private sector in the management and maintenance of solar mini-grids through public-private partnerships (PPPs).

A two-stage mini-grid tender (EOI/RFP) was developed within the framework of the RREP on the basis of the requirements listed above. The main objective of the call for tenders was to create a sustainable market for mini-grids based on viable business models that can operate without relying on long-term subsidies.

⁴⁸ Source: USAID/ARE Publication - www.ruralelec.org

The main lessons learned from the implementation of the RREP at this stage are as follows:

- The Government of Sierra Leone took full ownership of the project and strongly supported its implementation despite some red tape;
- The selection of sites should have been based on criteria specific to mini-grids in order to increase the chances of economic sustainability;
- A direct provision of funds, without the intermediary of the government, would have made implementation more effective;
- Private operators in charge of operating the mini-grid must be involved in the installation of the infrastructure;
- UNOPS procurement expertise provides real added value to the effective implementation of the project;
- Technical assistance to the public sector and also to private operators promotes the effective and successful implementation of the project, and strengthens understanding and trust between the various actors.

More details on this project and lessons learned are available in Appendix B.

3 Implementation strategy

3.1 Intervention strategy

The project will be implemented in two phases:

- A first pilot phase will develop, test and operationalize the best approach for effective implementation and optimal impact in the three countries. Based on the above context and the discussions held during the joint formulation mission, this pilot phase, with limited funding, will allow:
 - To test the implementation approach in Burkina Faso, Mali and Niger;
 - To operationalize one to two mini-grids per country, on sites to be defined at the beginning of the project in collaboration with ALG and the national authorities;
 - To initiate a reform of national regulatory frameworks for the investment and operation of off-grid mini-grids; in particular, with regard to tariffs, investment protection and operating contracts with the State (PPP contracts);
 - To support ALG and public and private sector actors in setting up a gender-responsive development and collaboration framework that is more favourable to investment and the development of mini-grids;
 - To develop income-generating activities in the three countries, supported by mini-grids that will constitute new sources of income for local populations (in particular women and youth) and contribute to their resilience and socio-economic development.

Based on the lessons learned from this first phase, a larger second phase will be deployed.

- The second phase of the project will consist of scaling up the achievements and results obtained in the pilot phase. In agreement with SIDA, a campaign to mobilize additional funds will be launched with technical and financial partners in order to build more structuring energy infrastructures and to continue the work of improving the ecosystem, in particular the institutional and normative framework around alternative sources of energy production.

On the basis of the formulation mission carried out and site visits, the technological choice has been made of photovoltaic mini-grids. Nevertheless, in some localities with populations with a low geographical concentration, solar kits could be preferred. The technological choice will be confirmed at the beginning of the project through the precise identification of the implementation sites and the evaluation of the demand (feasibility studies), in consultation with ALG and the States. A market

analysis will also be conducted at the beginning of the project in order to evaluate and find the most efficient approach for maximum impact.

ALG and national authorities have actively participated in the formulation phase, and will be key actors from the outset of the project and throughout its implementation. ALG will coordinate the action and supervise all activities until delivery. In addition, in order to ensure the sustainability of the outputs, the project will work closely with the States for the selection, according to national procedures, of private operators who will sign an operating contract for energy installations with each State on the basis of precise terms and conditions. Operationalization through the private sector will ensure the sustainability of the infrastructures.

3.2 Scope of intervention

3.2.1 Structure of the project's components, activities and outputs

The project is structured as follows:

N°	Components	Activities	Implementing partner	Outputs
1	Institutional support	Support for the creation/strengthening of a national coordination platform on off-grid clean energy	UNDP	- A national coordination platform on off-grid clean energy is operational in each country and meets frequently
		Development of an energy information, modelling and monitoring system		- An energy information, modelling and monitoring system is operational at the regional level and in the three countries and relevant institutions are trained to its use
2	Installation of off-grid power supply solutions	Identification, evaluation and confirmation of pilot project implementation sites in the three countries	UNOPS	- List of the implementation sites
		Community mobilization		- Studies and gender integrated market analysis carried out
		On-site studies (feasibility, technical) and gender integrated market analysis		- Business model defined
		Environmental impact studies and preparation for project implementation		- Agreements with communities
		Selection of operators		- Permits and licenses required obtained
		Procurement and installation of mini-grids		- Contracts between States and private operators signed
				- Installed and functional mini-grids
3	Support for the improvement of the regulatory frameworks	Conduct policy de-risking diagnosis in each country using UNDP's DREI (De-risking Renewable Energy Investments) methodology to support the country in the selection of optimal policy instruments for the promotion of private sector investments in off-grid clean energy, and support the elaboration of amendments to the existing regulatory frameworks and the implementation of the selected energy policy instruments	UNDP	- DREI diagnosis completed in each country - Energy policy reforms and regulatory framework improvements proposed, in order to increase private investments in the access to rural clean energy
4	Support for the development of the local private sector in the domain of renewable energy mini-grids	Needs assessment of local companies in installation, repair and maintenance of renewable energy infrastructures in the project areas	UNOPS	- Private sector needs assessment report
		Identification of financial mechanisms to support local companies operating in the renewable energy sector		- Financial instruments for supporting the local private sector
		Training for micro and small companies working in the field of renewable energy in the target areas		- Training and capacity building for local businesses
		Assessment of the potential for developing innovative models to improve the financial viability of mini-grid operators		
5	Support the development of revenue-generating activities in the cross-border regions of Liptako-Gourma	Carry out field surveys in order to assess the need for clean cooking solutions and the most adequate technologies, as well as the capacity and willingness to pay for such a solution in the target communities	UNDP	- Production centres for clean cooking solutions are established and able to commercialize their products sustainably in the region
		Support the establishment of clean cooking production centres in the target communities		- Households in the region use clean, affordable and sustainable cooking solutions
		Mobilize and train the beneficiaries and entrepreneurs on the operationalization of the clean cooking production centres, and in the marketing and distribution of their products		

Description of the project components:

1. Component 1: Institutional support (UNDP)

This component will consist of technical support to the different stakeholders for an effective implementation of the project and for the establishment of a more conducive and gender-responsive environment for off-grid renewables deployment in rural areas. This support aims to strengthen the capacities of institutional actors for better governance and political commitment to the renewable energy sector. It will concern in particular ALG, the Ministries in charge of Energy, the National Agencies in charge of rural electrification (ABER, AMADER, ANPER) as well as the National Agencies in charge of promoting renewable energies (ANEREE, AER, ANERSOL).

This component will also promote the sharing of experience and networking of these institutions with common interests. This networking and sharing of experience will be valuable for the implementation of the project in this pilot phase, but also in its second phase.

This component will be implemented by UNDP and ECREEE.

2. Component 2: Installation of off-grid power supply solutions (UNOPS)

This component will result in the installation of 6 mini-grids (2 in each country) based on solar photovoltaic technology. A significant potential for solar mini-grids has been identified in all three countries (see ALG study), and current actions by the three governments indicate a growing interest in setting up mini-grids in locations that cannot be connected to national grids in the short- to medium-term.

In addition, the international and national private sectors have shown a strong interest in the development of mini-grid projects. The initial assessment carried out during the joint ALG - UNOPS - UNDP formulation mission shows that, despite the difficult conditions in the three countries, there is sufficient potential for sites that will not be connected to national grids in the near future and would be suitable for mini-grid electrification; and both the private and public sectors seem willing to develop their partnership through a PPP approach.

Mini-grids help to take advantage of productive activities (in particular agricultural/artisanal production, etc.) in areas that will not be served by the network in the medium- to long-term, thus providing a viable opportunity for economic development. Productive activities typically performed by women will be particularly considered, thus contributing to women economic empowerment in the targeted areas. The hypothesis is that hybrid systems with a combined solar photovoltaic energy production capacity (average capacity of about 100 kWp per system) with battery storage (average capacity of about 418 kWh per system) and low voltage distribution networks (total length up to 10 km per system) will be installed at the selected sites. The planned sites have an average population of 5,000 inhabitants. The final sites will be selected on the basis of a GIS⁴⁹ study, and in close coordination with local authorities. The long-term commercial operation of the mini-grids will be based on viable business models, which will be developed under the project in close coordination with private sector representatives and following a preliminary gender integrated market analysis.

The reliability of long-term electricity supply is guaranteed by private operators of mini-grids who need their operation and investment to be economically viable. The project must therefore ensure the development of viable business models in close collaboration and coordination with the private sector, based on existing regulatory frameworks.

⁴⁹ Geographic Information System

This component will be implemented by UNOPS, considering its mandate for procurement and infrastructures and its similar experience in Sierra Leone. UNOPS will be supported by ALG and the relevant authorities and actors in all three countries of the Liptako-Gourma region.

3. Component 3: Support for the improvement of the regulatory frameworks (UNDP)

The objective of this component will be to establish a clear, supportive and gender-responsive regulatory framework for private investment in the three countries. Large-scale rural electrification for the benefit of rural communities in all three countries requires strong private sector participation, which faces many barriers to off-grid electrification. There is a need to create an ecosystem conducive to decentralized rural electrification by complementing or adjusting the legal and regulatory framework, the institutional environment, technical norms and standards, administrative procedures, and the operator selection system.

This component will be implemented by UNDP in collaboration with ECREEE who has been working on the improvement of the energy policy and regulatory frameworks of the ECOWAS countries (including Burkina Faso, Mali and Niger) since its creation in 2008.

4. Component 4: Support for the development of the local private sector in the domain of renewable energy mini-grids (UNOPS)

The project will also seek to identify locally registered renewable energy entrepreneurs and companies that already have operational experience in the field of mini grids to train their counterparts, install, operate and maintain the systems funded under this project. UNOPS will seek to ensure gender-balance and inclusion of the youth in the selection of entrepreneurs and companies that will benefit from this activity.

In addition, the project will assess opportunities to develop innovative models to improve the economic viability of mini-grid operators through the integration of secondary revenue sources. These models, already successfully tested in Tanzania and Nigeria, allow operators not only to market electricity supply in the community, but also to actively engage in the processing and trade of locally available natural resources (e.g. fishing, cattle, palm oil, cereals, etc.). Thus, access to a reliable supply of electricity and the presence of a professional operator capable of mobilizing additional investment and professionalizing the respective value chains will open up new opportunities to unlock local economic potential that would otherwise remain untapped.

UNOPS will be in charge of implementing this component, in collaboration with ALG, local and national authorities, the private sector companies selected in Component 2, and UNDP.

5. Component 5: Support for the development of revenue-generating activities in the cross-border regions of Liptako-Gourma (UNDP)

This component of the project will ensure that energy is used locally to produce wealth, predominantly for women and the youth. Access to clean energy can create jobs for young people and women, to ensure they can stay on their land and not move to urban areas out of financial necessity, but above all to prevent them from being recruited by violent extremist groups.

This component will be conducted in close coordination with the Joint Program for the Liptako-Gourma, which also includes a component on revenue-generating activities. Synergies will be created between the program and this project to maximize impacts on the target communities.

3.2.2 Roles and responsibilities

The project will be coordinated by ALG and implemented by UNOPS in collaboration with UNDP. Considering their respective mandates and comparative advantages, UNDP will support ALG in the context of institutional support (Component 1), and in the development of productive energy activities

to the benefit of communities (Component 5); while UNOPS will support the installation of mini-grids (Component 2) and support to local private sector development (Component 4). Technical assistance for improving the regulatory framework (Component 3) will be implemented by UNDP, in close coordination with UNOPS. UNDP's expertise in regional coordination, institutional dialogue and local and community development justifies its role in the implementation of Component 1 and Component 5. Experience in implementing similar projects for the development of mini solar networks, particularly in Sierra Leone, and the interdependence of Components 2 and 4 justify their implementation by UNOPS. Component 3 will be implemented by UNDP, in close coordination with UNOPS and under the leadership of ALG, building on ongoing initiatives in the three countries and in alignment with ECOWAS and UEMOA guidelines on energy regulation. This division of roles will facilitate and ensure effective implementation of the project.

	Responsible	Actors	Informed
Component 1 – Institutional support	UNDP	ECREEE, ALG, national authorities, national agencies for rural electrification, national agencies for the promotion of renewable energies, and national agencies for the regulation of the electricity sub-sector, UNOPS	
Component 2 - Installation of off-grid power supply solutions	UNOPS	ALG, national authorities, national agencies for rural electrification, national agencies for the promotion of renewable energies	UNDP
Component 3 - Support for the improvement of the regulatory frameworks	UNDP	ECREEE, ALG, States, national agencies for rural electrification, national agencies for the regulation of the electricity sub-sector, private operators, UNOPS	National agencies for the promotion of renewable energies
Component 4 - Support the development of local private sector in the domain of renewable energy mini-grids	UNOPS	ALG, national agencies for rural electrification, private companies and operators, banks, investors	UNDP
Component 5 – Support for the development of revenue-generating activities in the cross-border regions of Liptako-Gourma	UNDP	ECREEE, ALG, private companies, local communities, investors, local authorities, UNOPS	National agencies for rural electrification

Responsibilities matrix

3.2.3 Sites selection

The selection of sites for the installation of the mini-grids will be made at the beginning of the project on the basis of a number of criteria to be defined by ALG and national stakeholders, in collaboration with UNOPS and UNDP, taking into account the results of the gender analysis, and lessons learned from DFID/UNOPS project in Sierra Leone. For optimal intervention and maximum impact, it was initially decided that the project would be implemented, as much as is possible, in the same areas as the Joint Program. Safety and accessibility will be critical in the selection of sites, in addition to the criteria proposed in section 4.2.3.a. In addition to those criteria, the sites will be selected in order to avoid one ethnic group or community to be seen as privileged above another. As a project that aims at reducing the potential for conflicts, avoiding ethnic tensions will be important. That potential negative outcome will be mitigated through an informed site selection process in coordination with ALG and the States, but also through a real engagement with the targeted communities (community mobilization).

3.2.4 Hypothesis

For the implementation of the project, the following assumptions were taken into account:

- The political and security situation in the project's intervention areas does not prevent the proper implementation of activities;
- The national authorities respect their commitments to the project, in particular with regard to the allocation of sites, the issuing of construction permits, compliance with contracts with the private sector and the provision of technical experts from the Ministries of Energy and their other respective relevant agencies;
- The private sector confirms its interest and is involved in the operationalization of the project's infrastructure;
- The donor - the Swedish International Development Cooperation Agency (SIDA) - strictly monitors compliance with the contractual commitments between ALG, SIDA, UNOPS, and UNDP;
- Funding for the second phase is discussed and is almost guaranteed by SIDA, with potential input from other donors.

3.2.5 Constraints

The following factors may affect the effective implementation of the project:

- Lack of cooperation from local authorities and communities;
- Budgetary constraints;
- Deterioration of already potentially difficult security conditions at some sites;
- Low motivation and lack of leadership of national staff assigned to the project;
- Difficulty in accessing some sites.

3.2.6 Exclusions

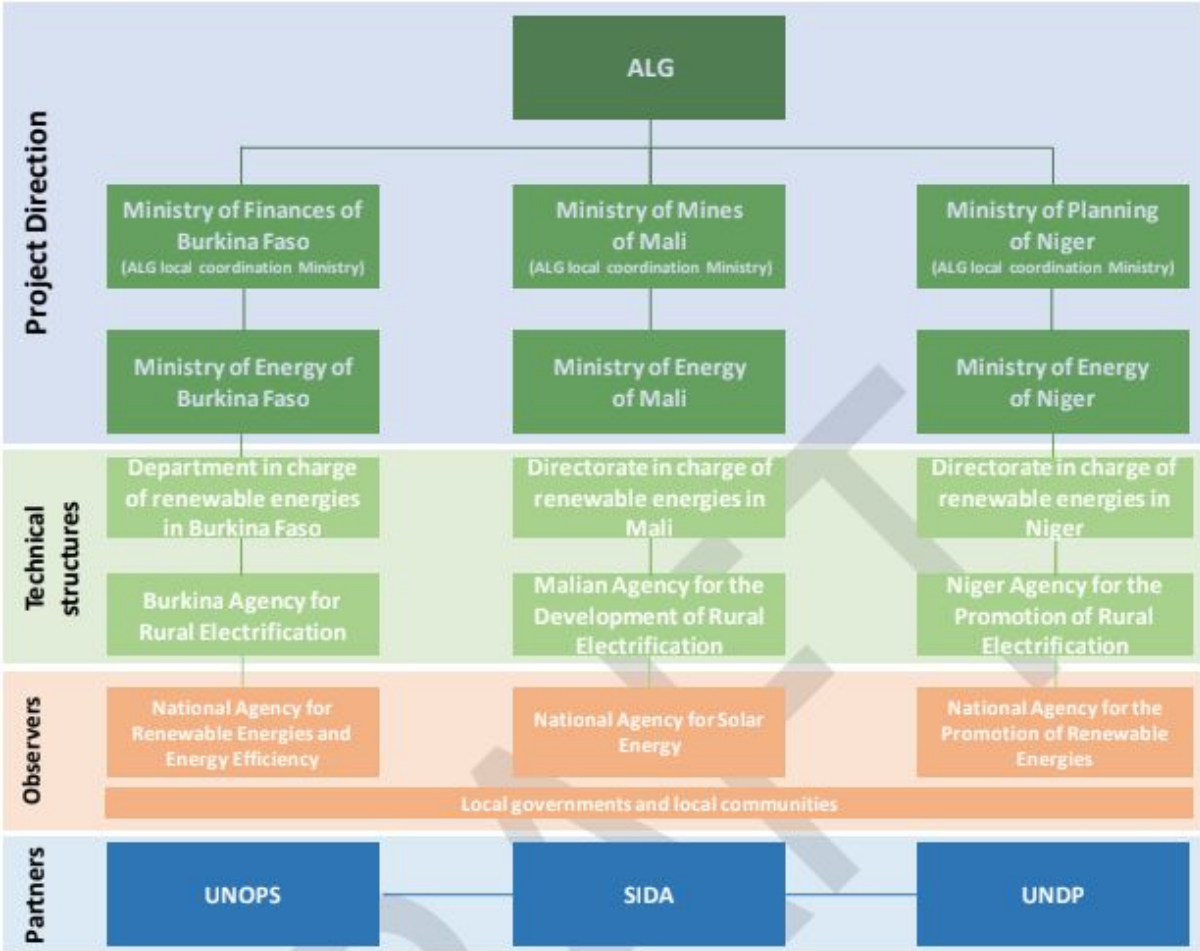
- Electrification or institutional support activities beyond the budget allocated for the implementation of this pilot phase;
- Intervention in high security risk areas for the project team;
- Purchase and installation of furniture and equipment outside the scope of the project;
- Obtaining the necessary building permits and authorizations, at the expense of the State;
- Financing and management of possible expropriation and resettlement of populations;
- Securing the site during the execution of the work, at the expense of the State;
- Operation and maintenance and upkeep of the delivered infrastructure.

3.3 Institutional anchorage

In order to promote the appropriation of the project by the States of Burkina Faso, Mali and Niger, and thus guarantee its sustainability, it will be institutionally anchored within the Executive Secretariat (ES) of the Liptako-Gourma Integrated State Development Authority (ALG). As such, ALG's SE will be the main anchor of the project. The Executive Secretariat, together with the respective Ministries of Energy of Burkina Faso, Mali and Niger, will constitute the institutional umbrella of the project.

In addition to ALG and the relevant Ministries (ALG line ministries and each country's Ministry of Energy), the project will be implemented in close collaboration with the various agencies responsible for rural electrification: Burkina Faso Rural Electrification Agency (ABER), Mali Rural Electrification Development Agency (AMADER), Niger Rural Electrification Promotion Agency (ANPER). These agencies will be the national technical counterparts of the project.

The departments in charge of renewable energies in the three countries as well as the agencies in charge of promoting renewable energies will also be involved as technical partners. These include the National Agency for Renewable Energies and Energy Efficiency (ANEREE) in Burkina Faso, the National Agency for Solar Energy (ANERSOL) in Mali, and the National Agency for the promotion of Renewable Energies (AER) in Niger.



Institutional scheme of the project

As institutional partners, ALG, Ministries of Energy and rural electrification agencies will have the following roles and responsibilities:

- (1) Encourage the involvement of communities and local communities and contribute to supporting strong involvement of women and the youth;
- (2) Participate in the system design process and approve locations and specifications in a timely manner;

- (3) Participate in the equipment purchasing process, approve orders and facilitate receipt (customs, etc.);
- (4) Request and obtain all necessary permits and authorizations to carry out the work in accordance with local legislation. If necessary, coordinate with the relevant local authorities to ensure support for the project;
- (5) Designate and assign a technical contact person to work with UNOPS, in particular for the finalization of the implementation strategy and procurement plan, participation in bidding committees, as well as any other activities necessary for the implementation of the project;
- (6) Sign the official minutes of the procedures as well as the minutes of the provisional receipts of the project deliverables;
- (7) Facilitate private sector involvement to ensure the sustainability of the project.

In accordance with the gender action plan that will be developed as first activity of the project, a mechanism will be established to safeguard that women are participating in the project at all levels, including community consultations/engagement initiatives.

At the end of the project, project assets such as vehicles and computers will be transferred to ALG and/or States according to the modalities defined with SIDA.

3.4 Stakeholders analysis

International and regional

Stakeholder	Role	Communication
Liptako-Gourma Integrated State Development Authority	Institutional anchorage	ALG will be represented at the Steering Committee and the Technical Committees. It will oversee the entire project and will receive regular reports on activities and progress.
Swedish International Development Cooperation Agency	Donor	SIDA will be represented at the Steering Committee. Regular reports will be sent to it on the activities carried out, the progress of the project and the rate of disbursement of the funding granted.
United Nations Program for Development	Implementing partner	UNDP will be represented at the Steering Committee and will participate in the implementation of the project.
United Nations Office for Project Services	Implementing partner	UNOPS will be represented at the Steering Committee and will participate in the implementation of the project.

Burkina Faso

Stakeholder	Role	Communication
Burkina Faso Ministry of Energy	Beneficiary	The Ministry will be represented at the Steering Committee and will supervise the activities carried out in Burkina Faso.
Burkina Agency for Rural Electrification (ABER)	Beneficiary	ABER will be represented at the Technical Committee. It will be involved in all project activities in Burkina Faso, particularly on technical aspects.
National Agency for Renewable Energies and Energy Efficiency (ANEREE)	Beneficiary	ANEREE will be represented at the Technical Committee as an observer, and may intervene in technical support to the project.

Mali

Stakeholder	Role	Communication
Mali Ministry of Energy	Beneficiary	The Ministry will be represented at the Steering Committee and will supervise the activities carried out in Mali.

Malian Agency for the Development of Rural Electrification (AMADER)	Beneficiary	AMADER will be represented at the Technical Committee. It will be involved in all project activities in Mali, particularly on technical aspects.
Agency for the promotion of Renewable Energies (AER)	Beneficiary	AER will be represented at the Technical Committee as an observer, and may intervene in technical support to the project.

Niger

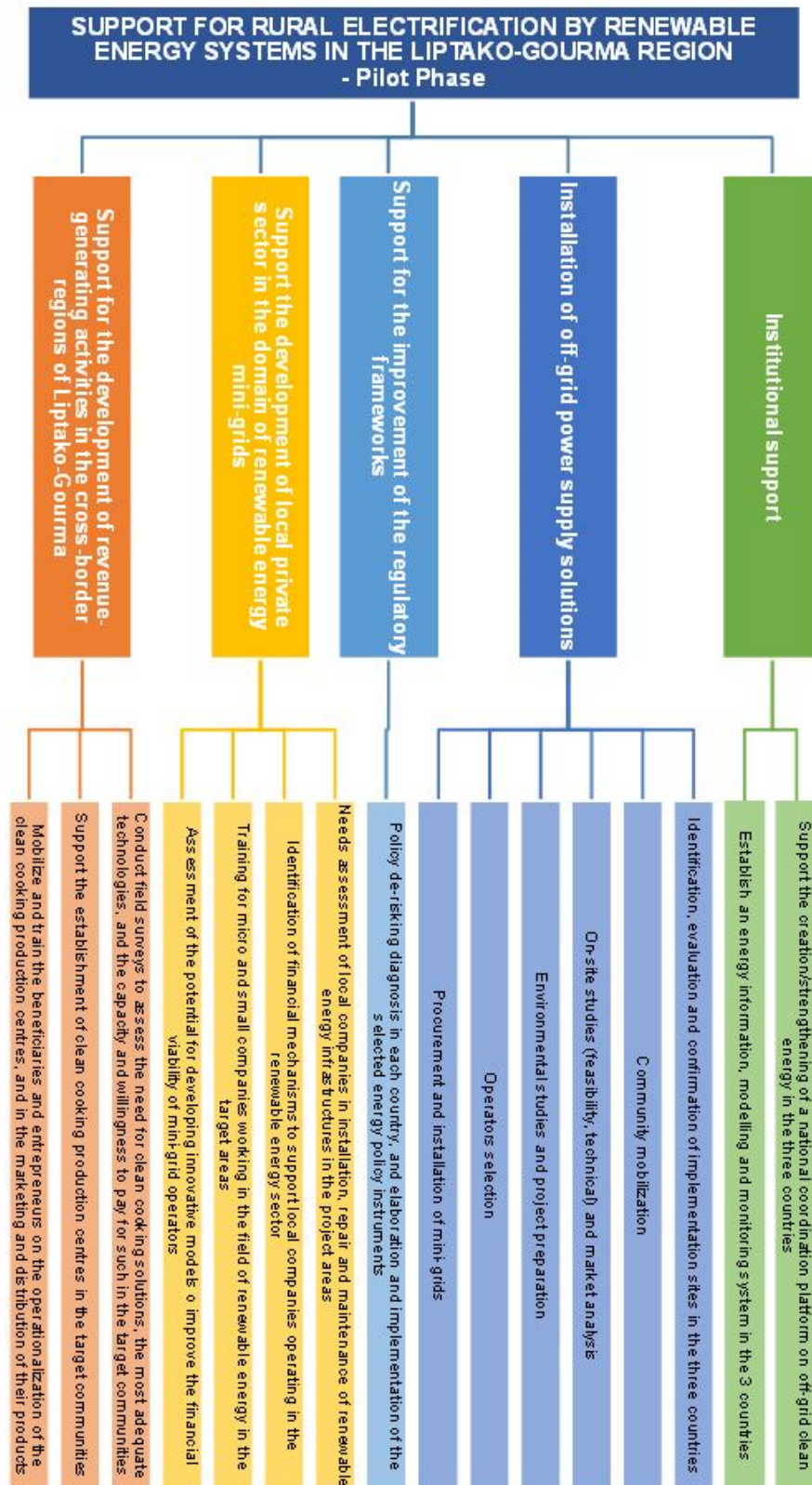
Stakeholder	Role	Communication
Niger Ministry of Energy	Beneficiary	The Ministry will be represented at the Steering Committee and will supervise the activities carried out in Niger.
Niger Agency for the Promotion of Rural Electrification (ANPER)	Beneficiary	ANPER will be represented at the Technical Committee. It will be involved in all project activities in Niger, particularly on technical aspects.
National Agency for Solar Energy (ANERSOL)	Beneficiary	ANERSOL will be represented at the Technical Committee as an observer, and may intervene in technical support to the project.

Other Structures

Stakeholder	Role	Communication
Local authorities and communities	Beneficiary	Local authorities and communities are the direct beneficiaries of the project, and will play a role in the implementation phase through community mobilization activities.
Contractors / Suppliers	Responsible for the execution of works and the delivery of the purchased equipment	Contractors and suppliers will be represented at the Technical Committee in order to provide their technical expertise.

4 Approach and implementation methodology

4.1 Work Breakdown Structure (WBS)



4.2 Implementation approach

The project will be implemented in accordance with UNOPS policies, including procurement policies⁵⁰, financial management policies⁵¹, and anti-fraud and anti-corruption policies⁵². UNOPS has a zero-tolerance policy on fraud and corruption, and this rule is strictly observed in all projects implemented by the organization.

The corresponding rules and policies of UNDP will also be respected, including its gender equality strategy and social and environmental standards.

4.2.1 Project Initiation and Gender analysis and action plan

Upon entry into force of the project agreement and receipt of funds, UNOPS will undertake the necessary activities to start the project in collaboration with UNDP and ALG:

- The project team will be recruited and installed. Its composition is detailed in section 4.7 - Structure of the project team;
- ALG will coordinate with the various responsible Ministries at the country level to inform them of the project launch and next steps;
- The project governance structures (Steering Committee and Technical Committees) will be put in place;
- A project launch workshop will be held in Ouagadougou (Burkina Faso), at ALG headquarters, in the presence of all stakeholders in order to share the project objectives and clarify the roles of each party in the implementation.

In the early phases of the project, a gender analysis will be conducted in order to assess the gender situation in the potential areas, confirm the project results framework, and complete/confirm the indicators' baselines. This gender analysis will be key to follow the impacts of the intervention on women, and recommend entry points for advancing gender equality and women's empowerment. It will be conducted jointly by UNOPS and UNDP gender experts and will lead to the elaboration of a gender action plan aligned with the project's components and the gender context in the targeted areas to specify clear activities to ensure progress on gender equality, along with targets, responsible party, timeframe and budget.

4.2.2 Component 1 – Institutional Support

- Outputs:**
- An inclusive national coordination platform on rural clean energy is operational in each of the 3 countries;
 - An efficient energy information, modelling and monitoring system is operational and used by relevant authorities in the 3 countries and at the regional level;
 - Institutional capacity at the national, regional and local levels are strengthened

This component will consist of technical support to the different stakeholders for an effective implementation of the project and for the establishment of a more conducive environment for off-grid renewables deployment in rural areas. This component will also promote the sharing of experience and networking of these institutions with common interests. This networking and sharing of experience will be valuable for the implementation of the project in this pilot phase, but also in its second phase.

Two activities will be conducted to achieve this component.

⁵⁰ https://content.unops.org/service-Line-Documents/Procurement/UNOPS-Procurement-Manual-2019_EN.pdf

⁵¹

https://content.unops.org/publications/Policies/EOD.ED.2017.04-Financial-Regulations-and-Rules_EN.pdf?mtime=20180406112859

⁵² https://content.unops.org/publications/Policies/OI.ED.2018.01-Policy-to-Address-Fraud-and-Corruption_EN.pdf

a. Support the creation/strengthening of a national coordination platform on off-grid clean energy in the three countries, that includes the main relevant stakeholders of the energy sector

This component will consist of technical support to the dialogue between the different stakeholders for an effective implementation of the project. A national consultation platform gathering the main stakeholders of the energy sector has proven an effective way to improve coordination and dialogue and to bring sustainable change. These platforms will facilitate many activities planned in the scope of the project and beyond, that require a multi-stakeholder engagement. National multi-sectorial committees on energy were created at the time of the UNDP PREP programme, including in Burkina Faso, Mali and Niger, but these committees could not always be maintained at the end of the programme.

Another success example of such platform can be seen in Zambia where a Task Force for Off-Grid Energy was formed in the scope of the Beyond the Grid Fund for Zambia project⁵³. This task force, led by the Vice-President of Zambia, was instrumental in designing effective improvements to the regulatory framework that met the different stakeholders' interests. Chairing this platform at the Vice-Presidency level allowed to overcome obstacles linked to differing interests between ministries.

In Burkina Faso, an interministerial commission for the facilitation of the multisectoral approach in energy (CIFAME) was created by decree in 2016 but could never start operating due to various challenges. In Mali, a multi-sectorial committee in energy is in existence but needs to be revitalized and strengthened. In Niger, a national multisectoral committee on energy has been operational since 2012, and is complemented since 2019 by a consultation group on energy.

In the scope of this project, a diagnosis will be assessed to identify the most relevant national platforms and their challenges, and strengthening activities will be conducted to improve their effectiveness and inclusivity. A particular emphasis will be put at strengthening women representation in these platforms in case the existing ones are not gender-balanced.

This activity will also provide an opportunity to promote dialogue and networking between different stakeholders, including between the different national agencies for rural electrification and promotion of renewable energy. This activity also aims to strengthen the capacities of institutional actors for better governance and strong political commitment to renewable energy.

This activity will be implemented by UNDP in collaboration with ECREEE, who has focal points at the Ministry of Energy in each of the three countries involved in this project.

b. Establish an energy information, modelling and monitoring system in the 3 countries

The gap assessment conducted in the scope of the preparation of this project indicated a strong need in all three countries of an operational and efficient information system to monitor the various electrification projects conducted in the energy sector and their actual implementation progress in the field. There is also a need for an energy modelling tool that would allow to identify least-cost options for electrification, based on a set of parameters input to the model, and that would facilitate decision-making for new developments.

⁵³ Source : <https://www.bgfz.org/bgfz-impact-update-june-2018/>

This activity aims at filling this gap by providing an integrated tool that will include 2 sub-components:

- A database of electrification projects linked with a geographic information system (GIS) that will allow the Ministry of Energy and its affiliated agencies to keep track efficiently on on-going and planned initiatives, with analytical functions to perform various data analysis and visualization related to these projects and their geographical location;
- An energy modelling component to model least-cost electrification solutions at various dates in the future in a given site based on a set of parameters such as distance to grid, distance to diesel sourcing, solar radiation, wind factors, water availability, etc. The tool will allow the user to test different scenarios depending, e.g. on the expected population growth, electricity demand, on-grid cost, etc.

These 2 components will be linked, so that data on the ongoing projects from the first component can feed into the second component to be taken into account in the modelling. This will allow in particular to identify priority regions that should be considered to benefit from new electrification projects.

This activity will include an initial feasibility study in each country to assess the existing databases and tools the system could build on, and collect the users' needs.

In order to harmonize approach and build on existing resources and capacity, this activity will seek to upgrade the existing "ECOWAS Observatory for Renewable Energy and Energy Efficiency"⁵⁴ hosted by ECREEE to include additional components, including a national module that countries will be able to access individually and customize to their national needs. The 3 countries included in this project will be the first benefitting from this tool, that may be expanded to all ECOWAS countries in the future.

The tool will also build on existing initiatives developed with contribution from UNDP, in particular the Global Electrification Platform (GEP)⁵⁵, an online platform developed by a consortium including the World Bank and KTH Royal Institute of Technology in Stockholm, in collaboration with UNDP and other institutions. The GEP is an open access, interactive, online platform that allows for overview of electrification investment scenarios for a selection of countries. The scenarios present pathways for achieving universal electricity access, split into an intermediate strategy for 2025 and full electrification by 2030. Users can explore 216 different scenarios to meet the access goals. These different combinations and parameters are presented in the form of "levers". Users can overlay additional layers as well (e.g. wind potential, electricity networks, location of health facilities) to help illustrate useful contextual information about a selected country. The current set of results in the GEP were created using the Open Source Spatial Electrification Tool. In the interests of transparency and collaboration, the modelling process has been opened for feedback and improvements from other institutions, experts and practitioners.

In the scope of this project, a partnership will be sought with the World Bank and KTH Royal Institute of Technology in order to support the development of improvements that would meet the needs of the governments of the 3 countries,

⁵⁴ <http://www.ecowrex.org/>

⁵⁵ <https://electrifynow.energydata.info/>

and that could be later potentially integrated in the GEP platform and benefit other countries.

Other systems of interest include the monitoring tool implemented by UNDP in the scope of the PUDC in Senegal⁵⁶, or the Energy Data and Intelligence System for Off-grid Networks (EDISON) in Zambia⁵⁷. UNDP, with its SDG Integration Team, has a strong expertise in modelling tools for sustainable development policies in particular in the rural electrification sector, that will be mobilized in the scope of this project.

4.2.3 Component 2 – Installation of off-grid power supply solutions

Outputs:	<ul style="list-style-type: none">- List of the implementation sites- Studies and gender integrated market analysis carried out- Business model defined- Agreements with communities- Permits and licenses required obtained- Contracts between States and private operators signed- Installed and functional mini-grids
-----------------	--

This component will result in the installation of 6 mini-grids (2 in each country) based on solar photovoltaic technology. Six activities will be implemented to achieve this component.

a. Identification, evaluation and confirmation of implementation sites in the three countries

To enable the commercially viable operation of mini-grids, it is crucial to select the best possible sites. The suitability of the sites depends on the selection criteria as defined and applied in the context of this activity. Field missions will be organized at the beginning of the project to assess potential sites. The final selection of sites will be made by governments, based on the recommendations of ALG and the project team. The project will ensure that the selected sites do not already host similar projects, and are secure enough despite the ongoing conflict, in order to avoid duplication among other interventions, to maximize impact, and to minimize security threats to beneficiaries. This selection will also take into account the results of the gender analysis.

The following selection criteria are proposed:

- Productive uses: Sites that offer opportunities to significantly unlock/improve natural resource value chains through access to electricity and additional investment, and these value chains can predominantly involve women (see Component 4).
- Population: Sites that provide a sufficient number of potential customers with high electricity use potential (economic operators, middle- and high-income households). The project will explore opportunities to encourage partnerships between mini-grid operators and individual solar kit suppliers.
- Distance to the national grid: Sites located more than 10 km from the existing electricity grid. Being too close to the national grid increases the risk that unscheduled network expansion activities may interfere with the development process of mini-grid projects and that customers may

⁵⁶

https://www.sn.undp.org/content/senegal/fr/home/operations/projects/poverty_reduction/programme-d-urgence-de-developpement-communautaire.html

⁵⁷ <https://edison.bgfz.org/>

complain about tariff differences (lower tariffs available on the national grid, highly subsidized). However, increasing the minimum distance from the national network as a selection criterion reduces the number of suitable sites.

- Public facilities: Sites with health and education infrastructure will be prioritized to ensure maximum positive impact, including beyond the immediate area of the mini-grid.
- Economies of scale: Where possible, the selected sites will be located close to each other to form clusters that can be served by a single operator, thereby reducing operational costs.
- Access to the sites: Despite the ability of UN agencies to draw upon the resources of UN Peacekeeping Missions and UNDSS (the United Nations Department for Safety and Security), there are still areas of all three countries that are considered “no-go areas” or “red zones” even for UN personnel. This must be considered in the choice of sites for this project in order to ensure success and sustainability of the intervention. However, there are opportunities for UNOPS to contract private security firms that can support interventions in remote areas that are difficult to reach; this has been done before in projects in Afghanistan and this can be discussed as part of the project development strategy.

b. Community mobilization

Close collaboration with the respective communities is an essential prerequisite for successful project implementation and long-term sustainable operation of the systems. The project will establish close relationships with communities, ensure participation and commitment by applying measures that have proven successful in similar electrification approaches, and measures that will be described in the gender action plan to strengthen women involvement, taking into account local specificities and constraints.

At the beginning of the project, village committees will be set up. These committees, which bring together all the community stakeholders (village chiefs, farmers, traders, women, young people), will be the main interlocutors of the project at the local level and will be platforms for exchange. After supporting the establishment of village committees representing the entire community in this process, a general 3-step approach will be adopted to sensitize village populations and convince a sufficient number of clients to register for an initial connection to the mini-grid. Initially, the project will organize village assemblies (or public meetings), followed by the distribution of brochures and awareness-raising in a second phase. The third step is the signing of electricity distribution contracts with end-users.

c. On-site studies (feasibility, technical) and gender integrated market analysis

The project will conduct feasibility and technical studies at all pre-selected sites to measure demand, design electricity generation and distribution systems and develop an appropriate business model for the long-term operation of the installations. A market analysis will also be conducted in order to dialogue with the local private sector, identify innovative companies, and identify relevant business models to be applied in the Liptako-Gourma context. This market analysis will be gender integrated and identify women owned businesses and barriers/opportunities with regard to socio-economic structures within this sector.

It is likely that a PPP approach will be preferred, whereby the three governments would provide financial support in the form of electricity subsidies and technical assistance in the form of project implementation support (provided by UNOPS), and the private partner would install and operate the mini-grid under a long-term contract.

d. Environmental studies and project preparation

In order to reduce the effort required from private operators and to accelerate the project implementation process to meet the deadlines, all the tasks necessary for the installation of the mini-grids will be carried out in advance, including obtaining the necessary permits for environmental impact assessments, construction permits, etc.

A consulting firm will be commissioned to carry out environmental impact studies on each site, or to establish an environmental management framework, in accordance with the legislation in force in each of the three countries. The results of these studies will be forwarded to the authorities responsible for issuing the environmental permits.

At the same time, the Ministries of Energy and rural electrification development agencies in each country will have to ensure that the sites are effectively made available for the installation of mini-grids and that the various necessary authorizations (occupation authorizations, building permits, etc.) are obtained.

e. Operators selection

The project will support the development and conduct of tenders for the selection of private companies responsible for the installation and activation of the systems as well as their long-term operation. Based on lessons learned from similar projects in the region, a rigorous selection process will be put in place and will lead to the award of PPP contracts with experienced and financially sound companies. A BOOT (Build-Own-Operate-Transfer) model is being considered at this stage.

As part of the technical assistance proposed under the project, companies will have guidance on all aspects related to the implementation of the systems and the establishment of sustainable operating models.

f. Procurement and installation of mini-grids

The hardware components of the mini-grids will be purchased by UNOPS. UNOPS' international tendering procedures will be followed, while taking into account, to the extent possible, national procurement contexts and policies.

Electricity generation and distribution equipment will be purchased in two separate processes. While the distribution equipment will be tendered for turnkey solutions, the power generation equipment will be purchased and delivered on site without installation.

The installation of production equipment will be carried out by the companies selected in the previous activity (selection of operators). Experience shows that the chances of success of mini-grid projects are higher if the operating companies are also responsible for the installation and commissioning of the systems. If systems are installed by a third party and only returned to operators after activation, the technical complexity is unnecessarily increased due to technical problems that often arise and can lead to significant delays and increased costs.

4.2.4 Component 3 – Support for the improvement of the regulatory frameworks

Output:

- Energy policy reforms and regulatory framework improvements are proposed, in order to increase private investments in the access to rural clean energy

The objective of this component will be to establish a clear, supportive and gender-responsive regulatory framework for private investment in the three countries. One activity is proposed to achieve this component.

- a. Conduct a diagnosis in each country using UNDP DREI (De-risking Renewable Energy Investments) methodology to support the country in the selection of optimal policy instruments for the promotion of private sector investments in off-grid clean energy, and support the elaboration of amendments to the existing regulatory frameworks and the implementation of the selected energy policy instruments**

This component will support public and private sector stakeholders - namely regulatory authorities and national agencies responsible for rural electrification (ABER, AMADER, and ANPER), companies, microfinance institutions, etc. - in their efforts to promote rural electrification, to strengthen their technical and operational skills, and to design gender-responsive policies and regulatory frameworks to expand off-grid access. The project will provide technical and financial support for planning, implementation support and capacity-building activities. This regulatory improvement effort will be aligned with UEMOA and ECOWAS initiatives and policies on energy regulation.

As a tool to assess and quantify market barriers to renewable energy investment in the developing world, UNDP has developed the De-risking Renewable Energy Investment (DREI) framework⁵⁸. The DREI framework systematically identifies the barriers and associated risks which can hold back private sector investment in renewable energy. It then assists policymakers to put in place packages of targeted public interventions to address these risks. Each public intervention acts in one of three ways: either reducing, transferring or compensating for risk. The overall aim is to cost-effectively achieve a risk-return profile that catalyses private sector investment at scale. In 2018, the DREI framework was extended to solar PV-battery mini-grids for off-grid electrification⁵⁹. The DREI methodology was applied in several countries, including in Nigeria in the on-grid⁶⁰ and off-grid⁶¹ sectors in the scope of two GEF-funded projects.

⁵⁸

https://www.undp.org/content/undp/en/home/librarypage/environment-energy/low_emission_climateresilientdevelopment/derisking-renewable-energy-investment.html

⁵⁹

https://www.undp.org/content/undp/en/home/librarypage/environment-energy/low_emission_climateresilientdevelopment/derisking-renewable-energy-investment/drei-off-grid-electrification-2018-.html

⁶⁰ <https://www.thegef.org/project/de-risking-renewable-energy-nama-nigerian-power-sector>

⁶¹ <https://www.thegef.org/project/de-risking-sustainable-grid-lighting-solutions-nigeria>

In this project, the DREI methodology will be applied to conduct an initial diagnosis of the off-grid electrification sector in the 3 countries and tailor selected interventions to mitigate the main risks identified. These activities will be conducted by a recruited expert in synergy with other initiatives for institutional and regulatory support currently implemented in the countries, and will be complemented by a capacity building workshop in each country, that will include e.g. training on business models and PPPs for off-grid electrification systems. The national consultation platforms described in the previous paragraph will help harmonizing and coordinating the different activities.

Improving the regulatory framework when necessary will be crucial, particularly for the implementation of the second phase of the project, on a larger scale. Based on the gaps identified, draft amendments of existing regulatory frameworks will be proposed, for instance specifically for mini-grids. This development will follow lessons learned and best practices from countries with similar conditions. Based on this experience, the project will follow the country-specific legislative and institutional structures when designing appropriate regulatory frameworks for the mini-grid sectors in the three countries covering all required documents and tools, such as the key document for mini-grid regulations, several annexes if necessary, and a tariff calculation tool based on a methodology adapted and agreed by the main stakeholders. The framework generally covers five key areas that determine the characteristics of the sector:

- Regulation of market entry,
- Regulation of retail rates,
- Regulation of service standards,
- Regulation of technical standards,
- Regulation in the case of connection to the national grid.

The different options for each of these regulatory aspects will be discussed with key stakeholders and will be subject to in-depth evaluation to determine what works best under country-specific conditions in terms of legislation, institutional structure, mini-grid market structure, socio-economic conditions in rural areas, planned financing conditions and other aspects. Where possible and appropriate, the project will promote the harmonization of policy, legal and regulatory frameworks between the three countries by building on each country's respective strengths.

This activity will start at the beginning of the project, in order to involve stakeholders at an early stage and seek to establish policy de-risking instruments that could already benefit the private sector in the timeframe of the project. However, the enforcement of these instruments will not be a prerequisite to install the off-grid clean energy systems planned in the scope of this project, as donor funding and the UN's favourable conditions of service will allow to mitigate the risks normally faced by private developers.

4.2.5 Component 4 – Support the development of local private sector in the domain of renewable energy mini-grids

Outputs:

- Private Sector Needs Assessment Report
- Report on existing and required financial models for supporting the local private sector
- Training tools for local companies
- Report on the possibilities of innovative business models based on the operation of mini-grids

The project will seek to identify locally registered renewable energy entrepreneurs and companies that already have operational experience in the mini-grid field to train their counterparts to install, operate and sustain the systems funded under this project. This component will be divided into four activities.

a. Needs assessment of local companies in installation, repair and maintenance of renewable energy infrastructures in the project areas

A survey will be conducted in the targeted areas to identify entrepreneurs and potential investors in companies installing and repairing mini-grids and providing individual solar kits, in particular women-led ones. Their needs will be assessed through face-to-face interviews and consultation workshops.

b. Identification of financial mechanisms to support local companies operating in the renewable energy sector

A financial expert will be hired to conduct a survey in the targeted areas on the financial instruments available for renewable energy companies and local products. Microfinance institutions and banks will be invited to discuss financial solutions for operators and investors in the field of renewable energy and for beneficiaries, as well as targeted incentives such as subsidized interest rates, a guarantee fund, a risk sharing mechanism, etc.

c. Training for micro and small companies working in the field of renewable energy in the target areas

The identified and selected companies and entrepreneurs will benefit from targeted training on topics relevant to rural electrification such as operating modes, tariffs, system performance and investment sustainability. These trainings will be conducted by experts, depending to the identified needs.

d. Assessment of the potential for developing innovative models to improve the financial viability of mini-grid operators

This assessment will aim to identify opportunities to develop markets or value chains by providing a reliable source of electricity through mini-grids; by immediately addressing market needs as they arise and by locking down the market or supply chain to prevent competitors from entering by using the synergies offered by mini-grid activities. Experts will be hired to conduct the analysis in the targeted regions using the following approach:

- Identify the unique characteristics of a site: Starting from the economic activities of the community, the expert will map the financial flows and economic operators of each community. Data collection for this step will be integrated into the questionnaires and semi-structured interviews of the field visits;
- Filling market needs with mini-grid models in the region to identify synergies and take advantage of opportunities: The expert will conduct a thorough review of the market needs acquired in step 1 based on the opportunities offered by mini-grid operators and make recommendations on the capacities that operators will need to take advantage of the opportunities;
- Setting up a high-income activity: This will be done in a second phase, after the operationalization of the mini-grids. Thus, at this stage, the expert will only make initial recommendations and a brief description of the procedure to be followed.

4.2.6 Component 5 – Support for the development of revenue-generating activities in the cross-border regions of Liptako-Gourma

- Outputs:**
- Development of a market for clean cooking solutions allows the significant and sustainable increase of revenue generation;
 - Affordable clean cooking solutions are manufactured and produced locally in the three countries and a critical mass of households have permanently switched to clean cooking solutions;
 - The beneficiary communities are mobilized and trained to use, manage and maintain the new equipment supported through the project.

This component of the project will ensure that energy is used locally to produce wealth. Three activities will be conducted to complete this component.

- Carry out gender-responsive field surveys in order to assess the need for clean cooking solutions and the most adequate technologies, as well as the capacity and willingness to pay for such a solution in the target communities. Identify optimal locations and business models for one rural centre per country for the production of clean cooking solutions for the local communities.**

The rate of access to clean cooking over the Sahel, in particular in rural areas, is critically low, and the situation is not different in Burkina Faso, Mali and Niger, where the national rates of access to clean cooking were 9%, 1% and 2% respectively in 2016⁶². Cooking in rural Africa is mainly done over 3-stone fires or very inefficient cookstoves, harming the health, the climate, and the environment. Inefficient combustion of solid fuels like wood, charcoal, animal dung, crop residue, and coal produce a range of climate-damaging emissions. Cooking this way not only releases greenhouse gases (GHGs) like carbon dioxide (CO₂), but also short-lived climate pollutants (SLCPs), including black carbon, a component of particulate matter emissions. In addition, unsustainable harvesting of wood for fuel contributes to forest and environmental degradation, and is a major driver of climate change. A range of options exist to increase the efficiency of the cooking process and reduce its negative impacts. Through better design and higher quality materials, improved cookstoves can significantly reduce air pollution and the amount of fuelwood needed. Alternative cooking fuels such as briquettes or biogas, when available, can provide additional long-term benefits. This activity will aim at assessing the demand and existing supply for clean cooking solutions in the target areas, as well as the willingness to pay and resources available for the development of new solutions, and their feasibility, based on a range of criteria. In particular, the compatibility of any new technology with local cooking habits will be assessed to prevent a lack of acceptance which has been a recurring cause of failure of such projects in Sub-Saharan Africa. Optimal solutions will be selected, with a maximum of one different technology per country. This activity will be conducted by an international expert in clean cooking solutions, local agro-economists and a gender expert and will lead to a report describing the selected optimal solutions, their recommended business and operating models, and the identified locations for the establishment of a production centre for the clean cooking solutions in each country. The business and operating models for these production centres will also be part of this study, and local private entities potentially able and interested to operate these centres will be identified in each

⁶² <https://trackingsdg7.esmap.org/countries>

country. This study will also assess potential interests from local finance institutions (e.g. micro-credits institutions) to participate in the project and design preferential financial instruments to support the establishment of clean cooking production centres (cf. below).

Additional sources of funding that could be used to scale up this action like the newly established Clean Cooking Fund at the World Bank will also be explored in this activity.

b. Support the establishment of women-led clean cooking production centres in the target communities

This activity will support the procurement and installation of women-led clean cooking production centres in the target communities, according to the delivery models recommended in the scope of the studies conducted in the first activity describe above (4.2.6.a)

c. Mobilize and train the beneficiary communities and women entrepreneurs on the operationalization of the clean cooking production centres, and in the marketing and distribution of their products

This activity will provide a broad range of technical assistance and trainings to support the revenue-generating activities created through the other activities in this component, from the time the revenue-generating activities are planned until the end of the project. This will aim at maximizing success and sustainability of these interventions, and detecting obstacles at an early stage in order to take actions to mitigate them.

4.2.7 Defect notification period, results monitoring and project closure

Upon completion of the installation of the mini-grids, provisional acceptance will be granted. Representatives of SIDA, ALG, Ministries of Energy, rural electrification agencies and local authorities will participate in the visits and meetings of the provisional receptions and countersign the minutes.

Each participant may make comments that will be recorded in the minutes prepared by UNOPS. A technical pre-acceptance between contractors, design offices, private operators and UNOPS may be undertaken to prepare the transfer.

Upon provisional acceptance, a warranty period in the event of a defect will be respected as follows:

- UNOPS will administer a twelve (12) months period for notification of defects after completion of the work and issuance of the provisional acceptance certificate;
- During this period, the infrastructure delivered will be operated by private operators, on the basis of operating contracts signed with the competent authorities. Any defects that may occur during this period as a result of improper workmanship will be corrected by the contractor, under the supervision of UNOPS;
- Final acceptance will be issued at the end of the defect notification period, based on the minutes signed jointly by the implementing entity and UNOPS. Representatives of SIDA, ALG, Ministries of Energy, rural electrification agencies and local authorities will participate in the final reception and sign the minutes.
- If the work is found not to be defective, UNOPS will remove the retentions and make the final payments; a certificate of completion will be issued to the company. UNOPS' responsibility will end after the declaration of completion.

This guarantee period will also allow to monitor the first results of the project and to draw the first lessons in view of the second phase of the project.

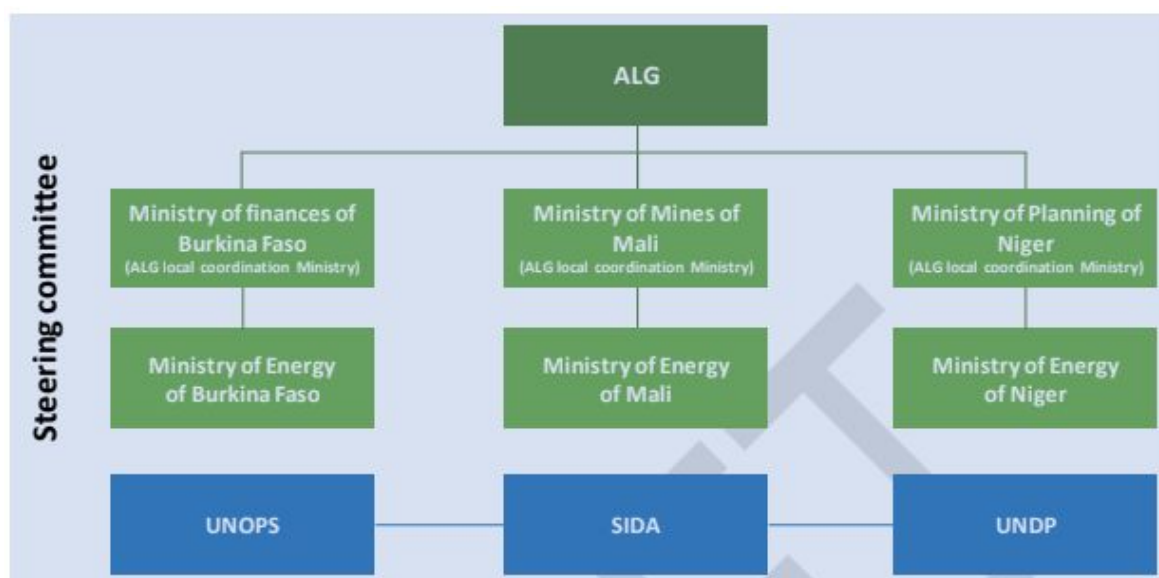
The project will be closed following this guarantee period.

4.3 Project governance

4.3.1 Steering Committee

A project coordination mechanism, the Steering Committee, will be established. It will be composed of representatives of SIDA, ALG, the Ministries responsible for ALG in the three States, the Ministries of Energy of the three States of Liptako-Gourma, UNOPS and UNDP. The Steering Committee will be the project's management and decision-making body and will facilitate effective and efficient collaboration between the various stakeholders in the implementation of the project. It will be responsible for supervising the proper implementation of the project and regular reports will be submitted to it on the progress made and the difficulties encountered during the implementation. The Steering Committee will also be in charge of defining the strategic orientation of the project and the general policy regarding its operational aspects.

The functioning modalities of the Steering Committee will be defined at the beginning of the project. It will meet at least once a year, if not biannually.



Structure of the steering committee

4.3.2 Technical Committees

When the project is launched, a technical committee will be set up in each country. It will be responsible for overseeing and approving the overall direction of the project and ensuring its alignment with the PRINCE2 methodology.

These committees will have the following responsibilities:

- Monitor the overall management of the project through the review and approval of work plans and procurement strategies and progress reports;
- Ensure budget control and possible budget reallocations; and
- Ensure that there are no obstacles to the implementation of the project and take measures to eliminate them, if necessary, in coordination with the steering committee.

The Technical Committee is an operational decision-making body. It will meet during the key stages of the project, such as:

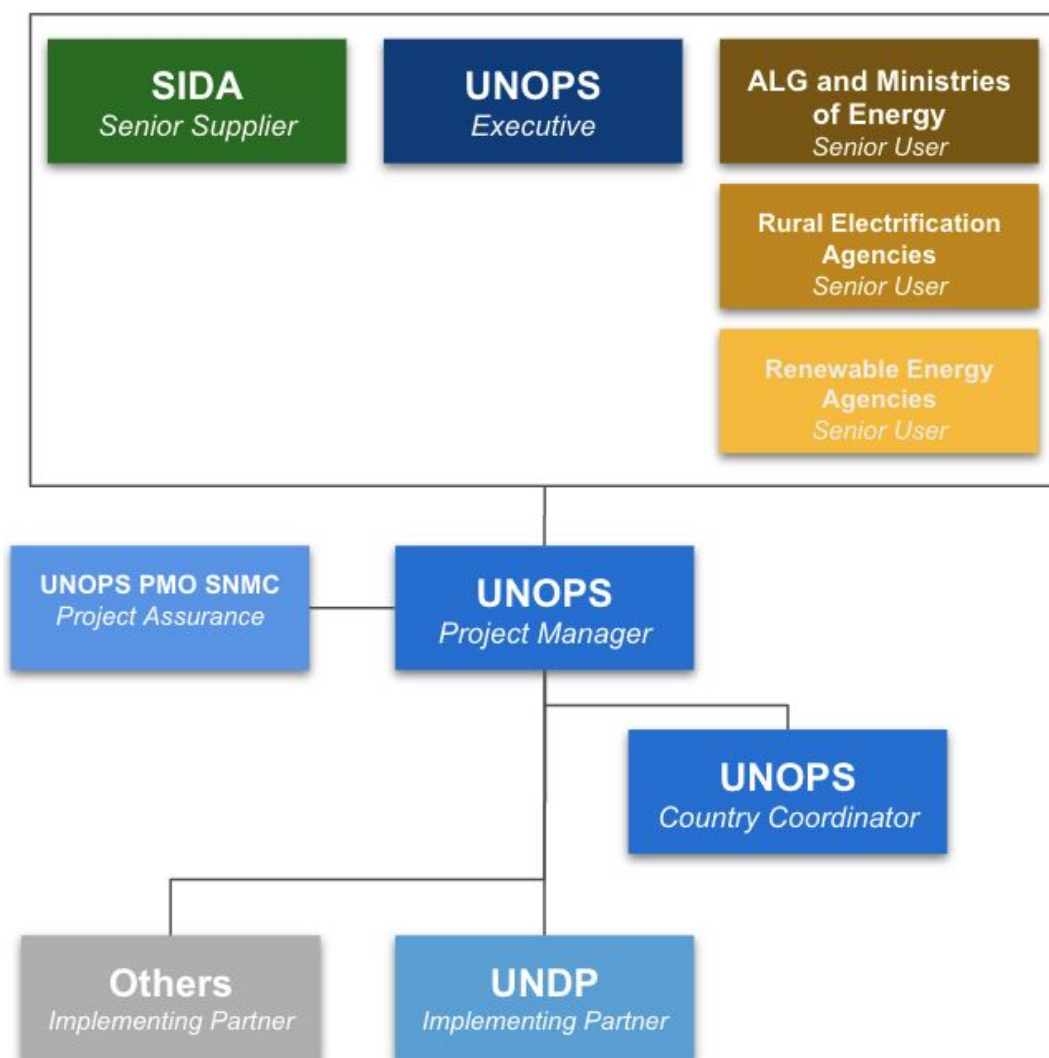
- The launch of the project;

- Validation of the results of the demand assessment and arbitration concerning the choice of systems and operationalization models; and
- Completion of installations and operationalization of systems; among other milestones.

The list of milestones will be defined when the project is launched. The Technical Committees may also be consulted at any time by the Steering Committee or at the request of one of its members. The minutes of the Technical Committee meetings will be sent for validation no later than 10 days after the meeting.

Each Technical Committee will be composed of:

- The **Executive** role has the primary responsibility to direct the project on behalf of the donor, the partners and the beneficiaries. It gives the main orientations of the project and ensures it is implemented as agreed.. UNOPS will be playing the role of project executive.
- The **Senior Users**, who represent the interests of the project beneficiaries and are responsible for evaluating the needs and defining the criteria for the success of the project. ALG, the departments in charge of renewable energies in each country and the national structures in charge of rural electrification (ABER, AMADER, ANPER) will be invited to play this role. National structures for the promotion of renewable energy (ANEREE, AER, ANERSOL), which will also be invited to participate in the committee as part of the senior user group to provide technical support for the design and implementation of the project;
- The **Senior supplier**, who represents the interests of the project's internal and external suppliers. He ensures that the necessary resources are available for the project. The main supplier also checks the feasibility of the proposed solutions. SIDA will be invited to play that role;
- The Project Manager will be in charge of supervising the project team and the implementation of the whole project. He will be directly responsible for the project outputs and will report to the Technical Committee board;
- The project assurance role will be occupied by the PMO of the Senegal Multi-Country Office of UNOPS(SNMC). The PMO will ensure the project manager follows the set procedures and is on track to achieve the project objectives in the allocated time and with the allocated budget;
- The implementing partners will support the project manager in conducting the project activities. They will be responsible to complete their respective tasks within the allocated timeline and budget, and they will report on the progress of their activities and the use of the allocated funds to the project manager;
- Administrations and local communities will also be involved and consulted throughout the project by the project manager and the implementing partners, with the support of the project team. Their involvement and ownership will be key to the success of the project.



Structure of the technical committees

Other actors may also be invited to participate in the Technical Committees as observers, upon proposal and joint decision of the permanent members. These may include implementing partners, other institutional actors, and civil society representatives, among others.

4.4 Risk management

4.4.1 Introduction

Risk management is a key aspect of project management. Many elements, both internal and external to the project, can have an impact on the achievement of its objectives. It is therefore essential to be able to analyse them and develop an approach in advance to manage all these elements.

As part of UNOPS' risk management approach, a risk management strategy is developed at the start of each project to ensure that procedures are applied to identify, assess and prioritize risks, plan and implement appropriate responses and communicate in a timely manner. The project team will work with the key stakeholders to develop the risk management strategy.

4.4.2 Main risks identified

Risk	Probability	Impact	Mitigation measures
Limited funding	High	High	Focus on the best approach in this pilot phase and laying the solid foundations for scaling up in a second phase with more funding.
Security concerns	High	High	As part of the project development strategy, UNOPS and UNDP will engage with UNDSS and DPKO to assess access to project sites and how to best protect beneficiaries and staff amid the ongoing conflict in the Sahel region.
Availability of funding	Medium	High	Availability of funds confirmed by the donor and disbursement schedule validated.
Lack of alignment of national legislation with the objectives of the project	Medium	High	Elaboration of Regional Guidelines, under the aegis of UEMOA and ECOWAS.
Political and security instability	Medium	High	Coordination with national authorities, and UNDSS; Anticipation and consultation within the steering committee; Establishing good relations with stakeholders and local communities, including through community mobilization.
Delay in the delivery of equipment	Medium	High	Regular follow-up and direct contact with the supplier.
Insufficient qualified and solvent companies for the installation and operation of infrastructures	Medium	High	Rigorous selection and contracting of companies.
Strong gender imbalance in the baseline that limits women's involvement in the project activities	Medium	High	Development of a gender analysis and action plan at the beginning of the project that precisely assesses the baseline and designs tailored measures to support gender mainstreaming in the project activities. Monitoring of the implementation of the gender action plan throughout the project.
Delays in obtaining the necessary authorizations and permits	Low	High	The national authorities shall take the necessary steps to obtain in a timely manner all permits and authorizations required by the legislation in force.
Lack of private sector interest	Low	High	Consultation of the private sector from the network design phase; Advocacy for greater private sector involvement in preparation for the second phase of the project.
Low cross-border cooperation	Medium	Medium	Implementation of a Regional Action Plan; Signing of specific cooperation agreements for this Program and its objectives.

Length of customs clearance procedures	Medium	Medium	Sends the necessary documents in due time; Support from local government partners.
Delay in the execution of works caused by the rainy season	Medium	Medium	Taking into account climatic conditions in planning and in particular in forecasting a conservative implementation period.
Change in exchange rates	Medium	Medium	Inclusion of contingencies in the budget estimate. Consultation and arbitration within the steering committee.
Significant variation in material costs during the project	Low	Medium	Inclusion of contingencies in the budget estimate. Consultation and arbitration within the steering committee.
Lack of support from local communities	Low	Medium	Community mobilization and involvement of the population throughout the process.
Lack of cooperation between the different national entities involved	Low	Medium	Involvement of all technical entities in the operational project committee under the coordination of ALG; Clarification of the roles of each entity from the beginning of the project.
Lack of continuity of the donor's commitment for phase 2	Low	Medium	Mobilization of funding from other donors for the operationalization of Phase 2.

4.4.3 Risk management procedure

The risk management procedure will be as follows:

- Identification (context and risk): Factors likely to have an impact on safety and security, the reputation of stakeholders (SIDA, ALG, Burkina Faso, Mali and Niger States, UNDP, UNOPS), costs, deadlines and quality of outputs, sustainability and product use are identified. This step aims to identify the strategic risks related to the project objectives, as well as those related to the service and project. The risk register that will result from this exercise will have to be reviewed at least quarterly to identify potential new risks and to monitor changes in previously identified risks.
- Assessment: The risk assessment in a project should remain simple, using the following probability and impact classification scale: very high, high, medium, low and very low. All risks with a high probability and high impact, and above, are considered critical and result in a plan to reduce their occurrence or mitigate their impact. All high probability and low impact or low probability and high impact risks should be regularly monitored and assessed.
- Planning: Each risk with a high probability and impact must be subject to a plan to reduce its occurrence or mitigate its impact.
- Implementation: All critical risk management plans will require approval and will be integrated into the overall project plan to allocate the necessary resources and identify and allocate responsibilities.
- Communication: All critical risks, as well as the evolution of other risks, must be communicated in progress and end-of-phase reports. Major risks will also be mentioned in the activity reports sent periodically to the donor.

4.4.4 Tools and techniques

The following tools and techniques are available to support risk management during the project life cycle:

- (1) **Lessons learned register:** Analyse lessons learned recorded for similar projects or programs. All projects must be the subject of a completion report that identifies lessons learned by analysing the project risk register.
- (2) **Risk management technique:** Project risk management involves the implementation of proactive measures. In short, effective risk management involves the use of techniques to:
 - Identify new risks associated with the project;
 - Assess the impact of risks on project objectives;
 - Prioritize risks that require action plans and implement these action plans;
 - Monitor the causes and triggers of risks;
 - Communicate with the various stakeholders;
 - Evaluate the process.

4.4.5 Security situation and foreseen mitigation measures

As mentioned in the context (2.1.1 Economic and social context of the Liptako-Gourma region), the Liptako-Gourma region is currently the epicentre of the security crisis in the Sahel with many armed groups operating at the borders of the three countries, taking advantage of their porous nature and the vulnerability of local communities. That situation may be a threat to the accomplishment of the project's objectives. However, mitigation measures will be developed in order to minimize that risk.

Through ALG, the project will be in constant contact with the State authorities in the intervention areas in order for them to be aware of the ALG presence and ensure that any security threat is escalated and tackled appropriately, with all stakeholders involved. The project will monitor established work plans daily, weekly or monthly - depending on the decision of the Project Manager in conjunction with their team and the partners and in light of the situation at that time - in order to ensure flexibility and capacity to adapt in a changing environment. These work plans will be validated at the Technical Committees' level, with SIDA notified but their approval not required on the plans. UNOPS is used to working in such environments, for example with past and ongoing collaboration with MINUSMA in order to ensure the transfer and security of the project teams from the capital city (Bamako) to the implementation sites in other parts of Mali. That collaboration will be reinforced. Moreover, as UN entities, UNDP and UNOPS can both request the services of UNDSS⁶³ in order to assist them in guaranteeing the security of the people and the installations during the implementation phase.

4.4.6 Focus on UNOPS policy to address fraud and corruption

UNOPS is committed to preventing, identifying and addressing all alleged acts of fraud or corruption against UNOPS and/or its activities, as it may impact its clients and/or partners, as well as beneficiaries of UNOPS-implemented programmes.

Regarding responsibilities and results of investigation:

- All parties involved in UNOPS activities have responsibilities in dealing with fraud and corruption as follows:
 - as an Organization: in enforcing staff and other personnel obligations, the Organization will act consistently and undertake the required investigative activity regardless of the length of service, position, title or relationship with UNOPS of the

⁶³ United Nations Department for Safety and Security

suspected offender. The Organization will pursue rigorously disciplinary and other actions against perpetrators of fraud and corruption, including recovery of financial loss suffered by UNOPS. The Organization will, in all instances, guarantee due process and confidentiality.

- as a Manager: managers must use their best endeavours to prevent and detect fraud and corruption. They are expected to put in place preventive controls. They should identify the risks to which assets, programmes, activities and interests are exposed. They should assess the identified risk, select avoidance options, design and implement cost effective prevention measures along with control processes and establish and implement measures to prevent recurrence. In addition, the management of the office in which fraud or attempted fraud has occurred should take action on recommendations made in the investigation report, intended to improve internal control. Managers who fail to take appropriate action or who tolerate or condone fraudulent or corrupt activities will be held accountable.
- as a Staff Member: fraud and corruption constitute misconduct for which a staff member (i.e. personnel appointed under the United Nations Staff Regulations and Rules) may be subject to disciplinary measures including dismissal, in line with applicable policies and procedures. In addition, individual cases may be referred to national authorities for criminal investigation.
- any other UNOPS personnel: individuals under other personnel arrangements such as contractors under Individual Contractor Agreements (ICA), interns and volunteers who are found to be the perpetrators of fraud or corruption may be terminated under the provisions of their contracts. In addition, individual cases may be referred to national authorities for criminal investigation.
- as a Vendor: actual and potential UNOPS vendors and their employees shall be informed of this policy through the UNOPS internet site. They shall be obligated to interact honestly in the provision of their services and to report allegations of fraud and corruption to UNOPS. Sanctions against vendors are governed by OI.PG.2017.02: Vendor Sanctions. In addition, UNOPS may seek recovery of financial loss and refer cases to national authorities for criminal investigation.

Regarding reporting of fraudulent and corrupt acts:

- Any staff member or other personnel who has a reasonable basis for suspecting that fraudulent or corrupt acts have occurred has a duty to report immediately his/her suspicions to his/her supervisor, and to the Internal Audit and Investigations Group (IAIG) (fraudhotline@unops.org).
- If a staff member or other member of personnel is found having knowledge of a possible fraud or corruption and not reporting it, he/she could be subject to disciplinary or administrative action(s).
- Confidentiality is essential to secure due process and to avoid damaging the reputation of subjects of suspected wrongdoing who may later be found not guilty. All reports shall be treated with the utmost discretion. Information related to any particular case shall not be shared with anyone other than those who need to be acquainted with them to conduct the preliminary assessment, investigation and disciplinary/administrative actions. However, if the person who has reported the alleged fraud or corruption is found to have acted with malice or deceit, he/she may be subject to disciplinary or administrative action(s). Any action taken by UNOPS is without prejudice to UNOPS' right to refer matters to local authorities for legal recourse in accordance with applicable national law.
- All cases against UNOPS personnel will be administered in accordance with UNOPS policy regarding Investigations and Measures Relating to Misconduct Allegations against

UNOPS Personnel. All cases against vendors will be administered in accordance with UNOPS policy on Vendor Sanctions.

Regarding investigations responsibilities:

- The Director, IAIG will make an initial assessment of the reported incident and may, at his/her discretion, decide that a preliminary assessment be conducted. Based on the preliminary assessment, if any, and/or IAIG's initial assessment, the Director, IAIG shall determine whether a formal investigation should be conducted and if so, to refer the case to:
 - IAIG personnel or outsourced professional investigator(s) working on behalf of the IAIG;
 - an ad-hoc investigation committee consisting of two or more UNOPS or other UN personnel (with at least one person employed by UNOPS under the United Nations Staff Regulations and Rules) appointed by the Executive Director; or
 - the Investigation Unit of UNDP Office for Audit and Investigations (UNDP-OAI), the United Nations Office of Internal Oversight Services (OIOS) or any other UN entity.
- In all cases, the final investigation report will be sent to the Human Resources Legal Officer in accordance with UNOPS' policy on Personnel Management Framework and UNOPS' policy on Investigations and Measures Relating to Misconduct Allegations against UNOPS Personnel or to the Vendor Review Committee in accordance UNOPS policy on Vendor Sanctions.

4.5 Sustainability management

The project's sustainability management approach will take into account social and environmental impacts, health and safety impacts, gender considerations, national ownership and local capacity building.

4.5.1 National ownership, exit strategy and capacity building

The implementation of the project will be guided by the Paris, Accra and Busan Principles on the coordination and effectiveness of international aid and national ownership.

The actions initiated within the framework of the project will be part of a logic of progressive withdrawal of technical and financial partners in favour of national ownership, guided by and aligned to national development strategies in all three countries of intervention.

Interlocutors from national and local structures will be identified and involved throughout the project in order to promote effective ownership.

In addition, the involvement of staff from the various national structures for rural electrification will be ensured during the project. Their involvement will facilitate the appropriation of the systems and equipment delivered as part of the project.

The exit strategy of the project will be ensured through:

- Technical and institutional support to national structures in charge of rural electrification and the promotion of renewable energies;
- Strengthening local capacities for the maintenance of the infrastructures and equipment delivered;
- And the preparation of the second phase of the project.

4.5.2 Development of income-generating activities

The identification of productive use opportunities in agricultural, artisanal and commercial production and transformation of products will be carried out through field consultations within the framework of the joint program, and will seek to identify productive activities that can predominantly

involve women. A number of economic users will be selected for targeted technical support and capacity building. Emphasis will be placed on women entrepreneurs and youth initiatives.

4.5.3 Gender

UNOPS and UNDP will make every effort to integrate all aspects related to gender and social inclusion of beneficiaries, from the design phase to infrastructure delivery. The project will ensure that the benefits are accessible to women, girls and all vulnerable branches of the community; in particular, through the development of income-generating activities for women and youth. UNOPS and UNDP are also committed to integrating women and vulnerable groups directly into the implementation of the project. UNOPS and UNDP will particularly promote the integration of a female workforce into the project and with contracting companies. The project will also be able to build on national policies for gender promotion.

This project will focus on ensuring that it is gender-responsive, in that it “identifies and acknowledges the existing differences and inequalities between women and men and articulates [...] initiatives which address the different needs, aspirations, capacities and contributions of women and men.”⁶⁴ This intervention will work towards being considered gender-transformative, including “actions and initiatives that challenge existing discriminatory policies and/or practices and carries out changes for the betterment of quality of life for all,”⁶⁵ while acknowledging the very entrenched gender norms that exist in all three countries of intervention.

When there is active involvement and participation of all relevant stakeholder groups and communities, the individual women and men who make-up these communities feel a sense of ownership over the project and how it contributes to results. When both women and men benefit from a project, they have ownership and interest in sustaining those benefits in the future.

Finally, “girls and women” are not a homogenous group and therefore the assessments conducted across all three countries will consider the ways in which women feel comfortable speaking about their needs and how internal hierarchies based on ethnicity, language, wealth, status and other intersectoral factors also affect the ability of female beneficiaries to feel comfortable voicing their opinions in certain spaces.

As a UN organization, UNOPS has a responsibility for achieving gender parity amongst its personnel, acting as a model of inclusivity and diversity to our partners and beneficiaries. As such, UNOPS will also ensure the representation of women in the project team. UNOPS is highly committed to promote an equal representation of women and men in its teams. UNOPS shall offer personnel a workplace that respects diversity, pursues equality, including gender equality, and encourages responsible leadership.

4.5.4 Environment

UNOPS has developed a social and environmental management policy to take into account the societal and environmental impacts of projects. UNOPS aims to minimize the environmental impact of infrastructure construction and use local resources for construction work.

The environmental sustainability of this project is ensured by the implementation of the UNOPS environmental management system, including an environmental assessment at the beginning of the project and the application of environmental impact mitigation measures throughout the implementation phase. The project will strive to integrate appropriate environmental standards into the design phase and be as energy efficient as possible.

⁶⁴ United Nations Educational, Scientific and Cultural Organization’s Gender-Sensitive Resources

⁶⁵ Ibid.

The project will also be based on UNDP social and environmental standards⁶⁶ and the related accountability mechanism⁶⁷.

4.5.5 Project health and safety plan

The health and safety monitoring of the project will be carried out in accordance with United Nations standards, taking into account the norms and standards of UNDP and UNOPS. In addition, UNOPS has developed an occupational health and safety policy to ensure the occupational health, safety and well-being of all persons involved in its projects. This includes UNOPS staff, partners, service providers, contractors and any other parties involved in a UNOPS project or visiting a UNOPS office or site. UNOPS will apply this policy throughout the implementation of the project.

4.6 Quality management

4.6.1 Introduction

The quality management process ensures that the delivery of equipment and infrastructure complies with standards as defined with partners, contractors and suppliers. It is essentially a risk management tool that ensures that the targeted objectives are achieved. The purpose of quality management is to ensure the satisfaction of partners and beneficiaries.

4.6.2 Quality management procedures

A quality management plan will be developed to ensure that project outputs meet expectations. Quality criteria for outputs (quality control) will be defined and UNOPS and UNDP will ensure that all project management processes are followed (quality assurance).

Quality control is the responsibility of the project team and will be carried out on site.

Quality assurance is the responsibility of the UNOPS and UNDP Offices in Senegal, which will ensure that project outputs are in line with the objectives set, meet the needs identified and have been achieved in accordance with previously defined and validated processes.

4.6.3 Tools and techniques

In order to guarantee the quality of the project outputs, measures will be taken to ensure continuous quality control of the work:

- (1) A design office will be recruited to control and supervise the work;
- (2) A UNOPS site engineer will regularly perform quality control before and during the execution of the work;
- (3) The project manager shall ensure the quality control of the work under his supervision;
- (4) The UNOPS and UNDP offices in Dakar, responsible for monitoring and quality assurance of the entire project, will participate in the bidding process in coordination with ALG. They will organize field monitoring missions to ensure that the work complies with requirements. These missions will take place after the start of the activities and according to the needs identified. In addition, project quality assurance will be assessed quarterly during the project quality assurance process in accordance with UNOPS standards;
- (5) A certain number of KPIs (number of connections, payment defaults, energy used, number of jobs created/economic impact in the areas concerned, among others) will be recorded at key stages throughout the project in order to keep track of the progress and effective impact of the project.

⁶⁶ <http://www.undp.org/ses>

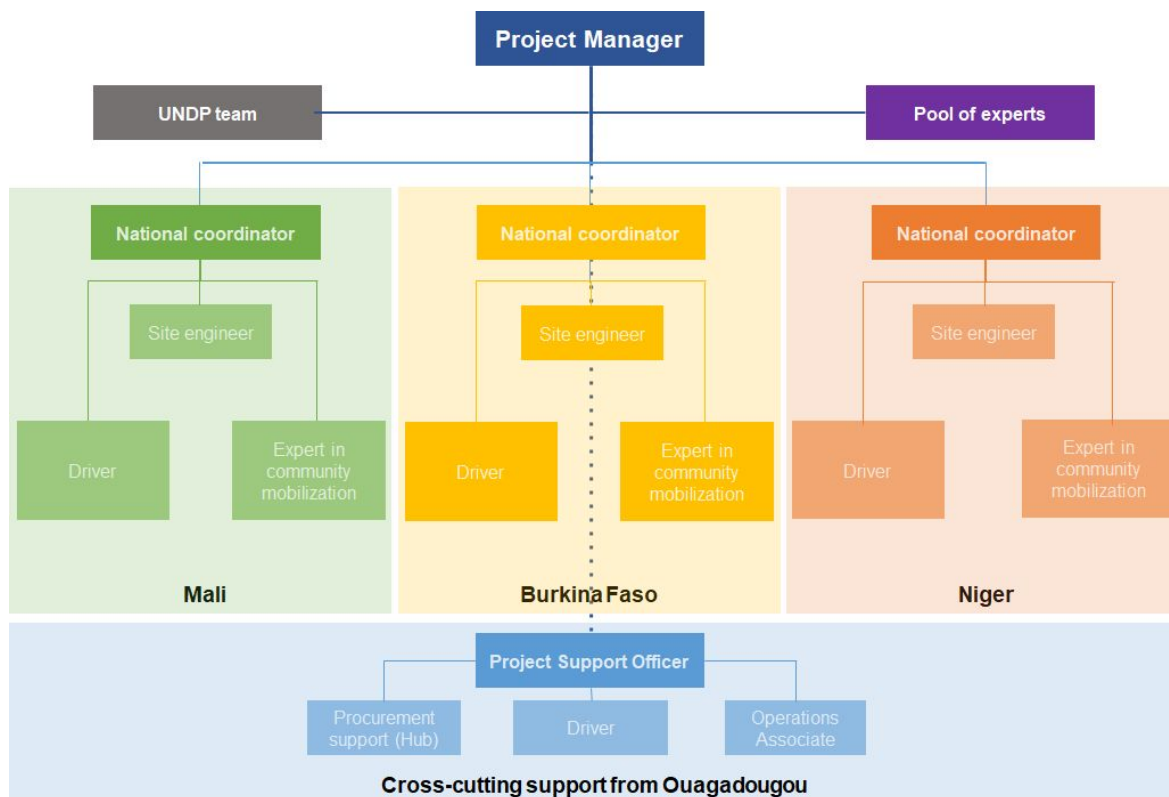
⁶⁷ <http://www.undp.org/secu-srm>

4.6.4 Calendar of quality management activities

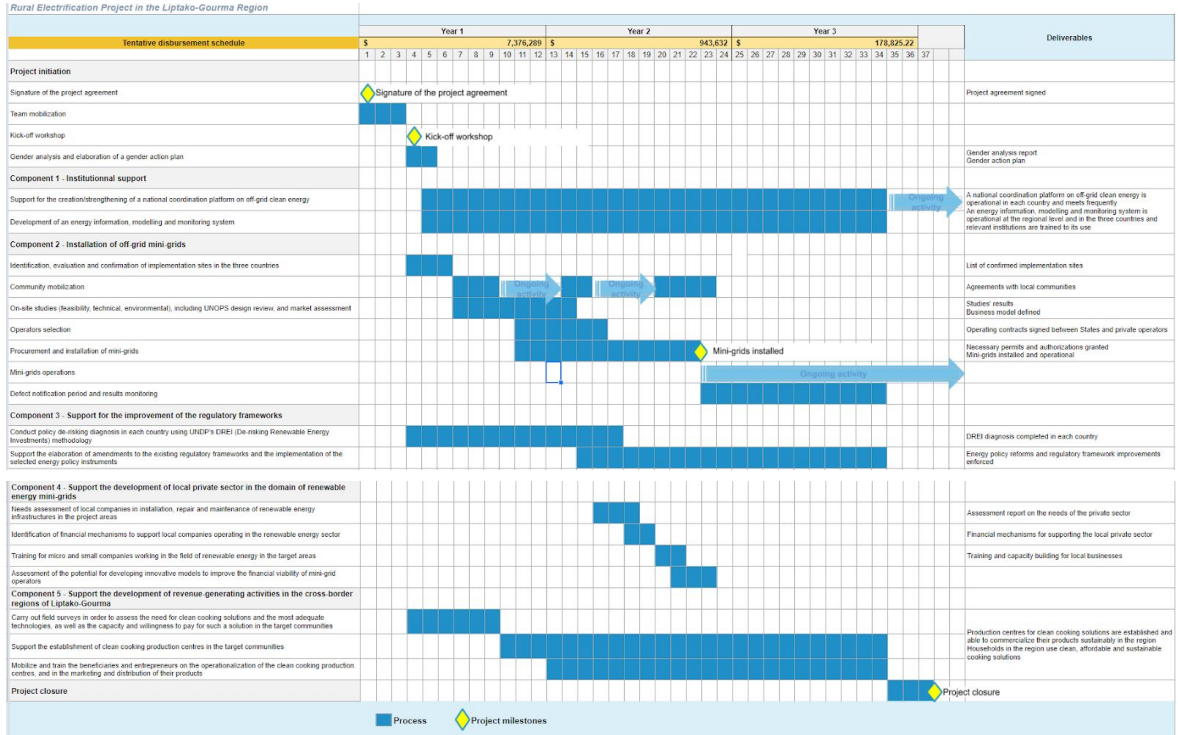
Quality management activities will be carried out in the following phases:

- (1) During the development phase of the project, the various outputs must be defined;
- (2) During the implementation phase, an inspection plan (with internal supervision or site visits) should be established and piloted by the project team before, during and after implementation. They will carry out the required quality tests. Quality control activities (regular activities, external control, materials verification) will be recorded in the quality register that will be attached to the project dashboard;
- (3) In the delivery phase of the project, technical inspections will be required to address concerns about the quality of the deliverables before delivery.

4.7 Structure of the project team



5 Provisional schedule, including tentative disbursement schedule



6 Budget and legal arrangements

6.1 Budget

Management personnel	\$ 1,538,500
Operationnal costs	\$ 738,320
Gender analysis and elaboration of a gender action plan	\$ 30,000
Provision for gender sensitive activities	\$ 50,000
Component 1 - Institutionnal Support, including dedicated personnel (UNDP)	\$ 449,000
Component 2 - Installation of off-grid mini-grids, including dedicated personnel (UNOPS)	\$ 3,900,193.75
Component 3 - Support for the improvement of the regulatory frameworks, including dedicated personnel (UNDP)	\$ 549,000
Component 4 - Support the development of local private sector in the domain of renewable energy mini-grids, including dedicated personnel (UNOPS)	\$ 124,431
Component 5 - Support the development of revenue-generating activities in the cross-border regions of Liptako-Gourma, including dedicated personnel (UNDP)	\$ 404,000
Subtotal	\$ 7,783,445
Management fees	\$ 715,301
Total	\$ 8,498,746

As estimated, the budget is distributed as follows: 65% for project components, 18% to cover the costs of management personnel to be recruited for the project, 8,6% for the project's operational costs, and 8,4% for management fees. Component 2 - Installation of off-grid power supply solutions benefits from 46,6% of the budget, due in particular to the equipment to be procured.

The total budget being relatively limited for a regional project of such importance, it requires essential project management and coordination costs, justifying additional costs in terms of human resources and operations. However, such a structure is necessary for effective implementation and achievement of the project's objectives.

UNOPS is a United Nations agency, self-financed on the basis of the projects it implements. UNOPS does not make any profit. Therefore, all allocated resources will be used in the project or otherwise restored to the partner. The project's budget management process is transparent and UNOPS will report to SIDA and ALG on the use of the funds allocated throughout the project.

6.2 Legal arrangements

UNOPS will be responsible for the results of the overall project. As such, three different sets of agreements will be signed, as follows:

1. UNOPS will sign a financing agreement with SIDA covering the entire project. UNOPS will be responsible for the reporting on the overall project activities, including the components to be implemented by UNDP. The tranches of payment to be received are detailed in the legal agreement, and follow reporting requirements discussed between SIDA and UNOPS.
2. A UN2UN agreement will be signed between UNOPS and UNDP, for the implementation of Components 1, 3 and 5. As described in 3.2.2 *Roles and Responsibilities* of this document, UNDP will be in charge of implementing these three components, with the support of the UNOPS project team. UNDP will submit regular (quarterly) reports on the activities and the funds under its responsibility. UNOPS will consolidate the reports and refer these back to SIDA, and will transfer the necessary funds for the activities of Components 1, 3 and 5 to

UNDP, as per reception of the payment tranches from SIDA and acceptance of the quarterly reports from UNDP.

3. A MoU will be signed between UNOPS and ALG in order to elaborate upon the areas of collaboration within the scope of this project, and what is expected from each party in the context of this project.

7 Appendices

A. Theory of change

The theory of change underpinning this project relies on the fact that access to energy is a critical condition to transform the living conditions and local economy in rural areas. Rural regions, in particular in the Sahel, are still widely dominated by an economy relying on agricultural and pastoral productions with little or no added value. Therefore, production efforts generate little revenue for rural communities. This situation worsens with the impacts of climate change and increasing land degradation, that exacerbate the vulnerability of rural populations, especially women, and the youth.

Renewable energy can revert this trend by creating opportunities for value addition (e.g. post-harvest transformation of agricultural products) and thus revenue generation without further contributing to greenhouse gas emissions or relying on unsustainable and expensive fuels. Clean energy can also improve agricultural practices (e.g. better irrigation using solar pumps) and reduce reliance on unsustainable biomass for cooking, therefore mitigating land and forest degradation. Thanks to electricity, economic activities can be diversified for instance in the IT sector, creating more employment opportunities and improving the resilience of the target communities. Creating job opportunities reduces rural exodus as well as recruitment of the youth by non-State armed groups. Access to renewable energy has a capital cost, which emphasizes the need to support the productive use of energy, in order for the target populations to generate revenues and be able to afford these solutions.

Providing clean energy to schools and health centres can also have a tremendous positive impact on development indicators such as literacy rate and birth or infant mortality rates in the target areas. More generally, SDG7 - universal access to clean energy - has been shown to be an enabler for almost all the other SDGs.

The massive deployment of renewable energy solutions needed today in regions such as the Liptako-Gourma requires to leverage significant private investments. This can only be achieved if a set of gender-responsive enabling conditions are met, through policy and financial de-risking (Component 1 and 3 in this project), and building of local technical and business expertise (Component 3). Failing to establish these conditions will significantly limit the impacts of interventions as well as their sustainability. Once the renewable energy solutions are deployed (Component 2), further support is also needed at the community level to build capacity in the productive use of energy (Component 5), which will lead to economic growth as explained previously. This project includes therefore all the necessary components to trigger long-term positive impacts in the target communities, and to pave the way for replicating similar interventions at a larger scale in the Liptako-Gourma region and beyond.

The scheme and assumptions below summarize the way this project will impact positively the rural population in the Liptako-Gourma region, and the way this impact can be tracked:

Current situation	Project components	Action plan	Outputs	Expected outcomes	Expected impacts	Tracking indicators		
<p>Low access to electricity in rural areas of the Liptako-Gourma region</p>	<p>Institutional support</p>	<ul style="list-style-type: none"> - Creation/strengthening of national coordination platforms - Energy information, modelling and monitoring system established 	<ul style="list-style-type: none"> - Better institutional and regulatory environment for renewable energy - Skills and tools made available to institutional actors 	<ul style="list-style-type: none"> - Access to electricity in B localities and their surroundings - Improved legislation for investment in solar energy - More regional collaboration and coordination of actions - New business opportunities in the renewable energies sectors 	<p>Poverty reduction and improvement of quality of life</p>	<ul style="list-style-type: none"> - Community members report increase in quality of life as a result of electrification (disaggregated by mt, age groups) 		
	<p>Installation of off-grid power supply solutions</p>	<ul style="list-style-type: none"> - Identification of pilot sites - Community engagement - Studies and market assessments - Selection of operators - Procurement and installation of mini-grids 	<ul style="list-style-type: none"> - Little to no penetration after 5 years - Studies and market analysts - Agreements with communities - Permits and licenses obtained - Contracts signed - Installed and grid-tied mini-grids 		<p>Reduction of CO2 emissions</p>	<ul style="list-style-type: none"> - CO2 emissions 		
	<p>Technical support for the improvement of regulatory frameworks</p>	<ul style="list-style-type: none"> - Diagnosis in each country using UNDP DREI methodology, and elaboration and implementation of amendments to the existing regulatory frameworks 	<ul style="list-style-type: none"> - Recognitive methods for improving the regulatory framework for mini-grids - Training private investors - Skills for public sector stakeholders - Proposals of a new legal framework for the mini-grid sector 		<p>Improved living and working conditions for women</p>	<ul style="list-style-type: none"> - Number of off-grid mini-grid operators - Percentage of women responsible for the operation and maintenance of mini-grids - Percentage of employees of mini-grid operators who are women 		
	<p>Support for the development of the local private sector in the domain of renewable energy mini-grids</p>	<ul style="list-style-type: none"> - Needs assessments of local companies in renewable energy infrastructure - Identification of financial mechanisms to support local companies - Trainings for identified companies - Assessment of innovative business models for mini-grid operators 	<ul style="list-style-type: none"> - Private Sector Needs Assessment Report - Report on existing and required financial models for supporting the local private sector - Training tool for development partners - Report on the possibilities of financing the business model based on the operation of mini-grids 		<p>Reduced potential for conflicts</p>	<ul style="list-style-type: none"> - Number of off-grid mini-grid operators - Percentage of off-grid mini-grid operators who are women - Percentage of employees of mini-grid operators who are women - Percentage of off-grid mini-grid operators who are women - Percentage of off-grid mini-grid operators who are women 		
	<p>Promotion of productive energy and ecological investment in the cross-border regions of Liptako-Gourma</p>	<ul style="list-style-type: none"> - Selection of technologies for productive use in the project implementation areas - Identification of entrepreneurs and project ideas - Support to project development 	<ul style="list-style-type: none"> - Installed technologies for productive use - Trained economic operators - Empowerment of women and youth - Micro-finance for the private sector - Business development visits and training - Improved infrastructure and market access 		<p>Favourable conditions for the development of employment opportunities for young people</p>	<ul style="list-style-type: none"> - Number of off-grid mini-grid operators - Percentage of off-grid mini-grid operators who are women - Percentage of employees of mini-grid operators who are women - Percentage of off-grid mini-grid operators who are women - Percentage of off-grid mini-grid operators who are women 		
	<ul style="list-style-type: none"> - Coordination with the UN Joint Sahel Programme, funded by SIDA - Focus on areas where the project will bring a cross-seen strong social impact (youth with schools, health practitioners, markets, etc.) - Strong collaboration with communities and local authorities, facilitated by signing of accord with AUC 	<p>Low access to electricity in rural areas of the Liptako-Gourma region</p>	<ul style="list-style-type: none"> - Creation/strengthening of national coordination platforms - Energy information, modelling and monitoring system established 		<ul style="list-style-type: none"> - Better institutional and regulatory environment for renewable energy - Skills and tools made available to institutional actors 	<ul style="list-style-type: none"> - Access to electricity in B localities and their surroundings - Improved legislation for investment in solar energy - More regional collaboration and coordination of actions - New business opportunities in the renewable energies sectors 	<p>Improved regulatory and legislative environment for investment</p>	<ul style="list-style-type: none"> - Number of off-grid mini-grid operators - Percentage of off-grid mini-grid operators who are women - Percentage of employees of mini-grid operators who are women - Percentage of off-grid mini-grid operators who are women - Percentage of off-grid mini-grid operators who are women
							<p>Improved health conditions</p>	<ul style="list-style-type: none"> - Maternal mortality rate - Child mortality rate - Overall mortality rate in targeted areas
<p>Improved education environment</p>	<ul style="list-style-type: none"> - Number of off-grid mini-grid operators - Percentage of off-grid mini-grid operators who are women - Percentage of employees of mini-grid operators who are women - Percentage of off-grid mini-grid operators who are women - Percentage of off-grid mini-grid operators who are women 							
<p>Increased involvement of the private sector in rural electrification</p>	<ul style="list-style-type: none"> - Number of off-grid mini-grid operators - Percentage of off-grid mini-grid operators who are women - Percentage of employees of mini-grid operators who are women - Percentage of off-grid mini-grid operators who are women - Percentage of off-grid mini-grid operators who are women 							
<p>Strengthened national, regional and local institutional capacities</p>	<ul style="list-style-type: none"> - Number of off-grid mini-grid operators - Percentage of off-grid mini-grid operators who are women - Percentage of employees of mini-grid operators who are women - Percentage of off-grid mini-grid operators who are women - Percentage of off-grid mini-grid operators who are women 							

For the formulation of the project, the following assumptions were taken into account:

- The political and security situation in the project's intervention areas does not prevent the proper implementation of activities;
- The national authorities respect their commitments to the project, in particular with regard to the allocation of sites, the issuing of construction permits, compliance with contracts with the private sector and the provision of technical experts from the Ministries of Energy and the respective agencies;
- The private sector confirms its interest and is involved in the operationalization of the project's infrastructure;
- The donor - the Swedish International Development Cooperation Agency (SIDA) - strictly monitors compliance with the contractual commitments between ALG, SIDA, UNOPS, and UNDP;
- Funding for the second phase is discussed and is almost guaranteed by SIDA, with potential input from other donors.

The following factors may affect the effective implementation of the project:

- Lack of cooperation from local authorities and communities;
- Budgetary constraints;
- Deterioration of already potentially difficult security conditions at some sites;
- Low motivation and lack of leadership of national staff assigned to the project;
- Difficulty to access some sites.

The following activities, without being exhaustive, are not part of the project's responsibility:

- Electrification or institutional support activities beyond the budget allocated for the implementation of this pilot phase;
- Intervention in high security risk areas for the project team;
- Purchase and installation of furniture and equipment outside the scope of the project;
- Obtaining the necessary building permits and authorizations, at the expense of the State;
- Financing and management of possible expropriation and resettlement of populations;
- Securing the site during the execution of the work, at the expense of the State;
- Operation and maintenance and upkeep of the delivered infrastructure.

The assumptions for expected outcomes and impacts include the one considered for the formulation of the project, but also the followings:

- There is an alleged political will to promote rural electrification and the development of renewable energies in all three countries;
- The installations are properly operated by the selected companies and population value that added asset to their community;
- The populations pay their bills as due to the mini-grids operator(s);
- National and local authorities promote investments and the creation of local businesses;
- Authorities support the health posts and health centres, which now have access to electricity through the mini-grids, with the adequate equipment and personnel;
- The national and international private sector invests more in the Liptako-Gourma region, in various services, including the energy sector;
- Vocations are created and new professional trainings in electricity and renewable energies are available in the three countries.

B. Relevant indicators from ALG study

SOCIOECONOMIC INFRASTRUCTURES OF THE STUDIED LOCALITIES										
Country		Mill	Carpenter	Welding	Mechanic	Garage	Battery charging	Hairdressing	Pharmacy	Cereals Bank
Burkina-Faso	Nb	220	65	104	321	0	132	234	101	40
	r.									
Mali	%	N/A	N/A	N/A	70	0	27	57	39	30
	Nb	209	47	122	102	0	236	65	98	143
Niger	r.									
	%	54	24	58	45	0	38	25	25	69
Niger	Nb	135	23	10	80	0	137	95	15	40
	r.									
	%	60	14	7	39	0	36	44	10	34

FINANCIAL SUPPORT OF IGAs IN THE STUDIED LOCALITIES								
Country	Microcredit Institutions				Microcredit repartition			
	Bank	Fund	Tontine	Other	Bank	Fund	Tontine	Other
Burkina-Faso	0	1	31	0	0	1	31	0
Mali	0	16	53	0	0	16	47	0
Niger	0	0	33	0	0	0	33	0

ACCESS TO ELECTRICITY AND ENERGY BY COMMUNITIES IN THE STUDIED LOCALITIES								
Countries	Equipment used for lighting					Water pumping power source		
	Oil Lamps	Battery Torches	Batteries	Gas Lamp	Biogas	Generator	Diesel engine	Solar panel
Burkina Faso	14	100	75	N/A	N/A	0	0	3
Mali	44	98	77	N/A	N/A	22	4	52
Niger	34	98	98	N/A	N/A	0	2	5

C. Policy and regulatory frameworks, institutional structures and baseline of programmes and projects on access to clean energy in rural areas in the three countries

(1) Burkina Faso

a. Policy and regulatory framework

According to the Energy Sector Policy 2014-2025, Burkina Faso seeks to lower its cost of energy, increase the electricity access rate to 95%, and achieve a renewable energy target of 50% by 2025⁶⁸. Further, Burkina Faso has pledged mitigation contributions for electricity generation in the Nationally Determined Contribution (NDC) as described in the table below⁶⁹.

	2015	2020	2025	2030
Unconditional	22.18	284.3	344.4	493.04
Conditional	22.18	73.87	94.10	162.80

GHG emission reduction targets for electricity generation, ktCO 2e: 2015-2030; Source: INDC (2015)

According to the Renewable Energy Action Plan 2015-2020/2030 (PANER, 2015)⁷⁰, renewable on-grid capacity installation (318 MW) will outstrip renewable off-grid capacity installation (10 MW) by a factor of 32 in 2030, demonstrating the continued emphasis on grid extension. Well designed, operated and maintained off-grid systems such as solar mini-grids have however the potential to speed up the rural electrification process while allowing connection to the national grid once available to sell any excess electricity.

In 2016, the Ministry of Energy wrote a new policy for the energy sector (LPSE). Renewable energy and energy efficiency were defined as important axes of development of the energy sector.

In April 2017, Burkina Faso adopted a new law on the energy sector that is perceived positively by investors and other key partners in the sector (“Loi n°014-2017/AN du 20 avril 2017 portant réglementation générale du secteur de l’énergie”). That law contributes to liberalizing the electricity sector. It promotes competition for electricity supply through the creation of a competitive wholesale electricity market that abrogated SONABEL’s single buyer arrangement.

b. Institutional structure

The electricity sector in Burkina Faso is under the supervision of the Ministry of Energy and Mines. Since 2016, the Ministry is composed of three general directions: “Direction Générale des Énergies Renouvelables” (DGER), “Direction Générale des Énergies Conventionnelles” (DGEC) and “Direction Générale de l’Efficacité Energétique” (DGEE).

In addition, a new agency dedicated to renewable energy and energy efficiency, the National Agency for Renewable Energy and Energy Efficiency (ANEREE) was created in 2016.

⁶⁸Source: Ministry of Energy (2013) Energy Sector Policy 2014-2025

⁶⁹ Source: Government of Burkina Faso (2015) Burkina Faso’s Intended Nationally Determined Contribution

⁷⁰ Source: Ministry of Mines and Energy (2015) National Renewable Energy Action Plan; https://www.se4all-africa.org/fileadmin/uploads/se4all/Documents/Country_PANER/Burkina_Faso_Plan_d_Actions_National_pour_les_Energies_Renouvelables.pdf - accessed 17 September 2019.

Other key players in the sector are the sector regulator (ARSE), The National Electricity Company (SONABEL) and the Fonds de Development of Electrification (FDE), transformed in 2017 into the Rural Electrification Agency of Burkina Faso (ABER). ABER develops and tender rural electrification projects identified by central and local governments, as well as by private investors or operators, with both on-grid and off-grid technologies. ABER acts as a de facto technical quality regulator in the rural electricity sub-sector.

The country is divided into two distribution segments: the first segment includes the main urban areas and are served by SONABEL, which has a monopoly over transmission and distribution. Generation is open to independent power producers (IPPs), but without much success so far because SONABEL is not perceived as a financially sound off-taker.

The second segment includes rural areas, which are the responsibility of ABER. The agency coordinates electrification programs and provides funding to rural electrification promoters in the form of grants and loans. The electricity generation systems in rural areas are run by local cooperatives called COOPELs generally managed by small volunteers' teams, which execute simple tasks such as administration, invoicing and bill collection. There is a national coordinator, the National Union of Electricity Co-operatives in Burkina Faso (UNCOOPEL), which lobbies for financing of the COOPELs and conducts trainings and support visits. Currently, there are more than 180 local cooperatives with an authorization to manage local distribution networks in the second segment. 77% of them (in 2015) were connected to the grid and purchased power in bulk from SONABEL, but the remaining ones had decentralized generation assets. In 2015, 16% of the COOPEL generation systems were estimated to include a photovoltaic (PV) component. COOPELs have been facing numerous challenges including a lack of financial sustainability and a continuous reliance on funding and subsidies from ABER⁷¹. In light of this experience and the failure of this model to improve rural electrification, there is currently a willingness of the authorities to take measures to encourage private sector investments and to enable a financially sustainable operating model for electricity production in rural areas⁷².

c. Baseline of programmes and projects on access to clean energy in rural areas

Several projects are focusing on increasing rural access to clean energy in Burkina Faso. The main ongoing projects are described in the following paragraphs.

The 4-year GEF-7 Africa mini-grids program is a regional initiative led by UNDP in partnership with AfDB that will initially support from 2021 onwards nine countries including Burkina Faso to increase rural energy access by reducing the cost and increasing viability of renewable energy mini-grids. The program is funded through a USD 24.3 million grant from the GEF and USD 344.3 million co-financing. In Burkina Faso, there will be a need to create synergies with the UNOPS/UNDP project, in particular for the Component 1 (Institutional support), 2 (Installation of off-grid power supply solutions) and 3 (Technical support for the improvement of regulatory frameworks).

This GCF-funded Yeleen Rural Electrification Project (USD 27.1million; 2019-2025) implemented by the African Development Bank aims to create an enabling environment for the private sector to invest in and operate solar mini-grids. The project will include installing 100 mini-grids (11.4 MW; 50,000 household connections; 3,300 productive use connections) in Burkina Faso using results-based payments to private sector operators, improving the regulatory framework in order to mobilize private

⁷¹ Source: Funding proposal, FP093: Yeleen Rural Electrification Project in Burkina Faso, African Development Bank, Green Climate Fund, 2018

⁷² Source: Funding proposal, FP093: Yeleen Rural Electrification Project in Burkina Faso, African Development Bank, Green Climate Fund, 2018

sector capital in renewable energy-based rural electrification investments, and provision of productive use equipment to support economic activity in the targeted regions. The targeted regions are Haut-Basins (total 1.6 million people) and Boucle du Mouhoun (total 1.5 million people), which are outside the Liptako-Gourma region. Therefore, there will be no duplication of interventions with the UNOPS/UNDP project which targets the Liptako-Gourma region exclusively. However, the Yeleen rural electrification project includes a USD 1 million grant provided by the AfDB's Sustainable Energy Fund for Africa (SEFA) to hire consultants to review the legal, regulatory and institutional framework for rural mini-grids. The support will include drafting the documents and technical assistance for selection of consultants. The expected result is FDE/ABER agents to be fully conversant with mini-grid legal, financial and contractual processes and the necessary enabling environment fully enforced. Component 3 of the UNOPS/UNDP project will need to create synergies and complement this ongoing activity.

The Lighting Africa initiative is currently supporting improved access to off-grid solar products in Burkina Faso through two World Bank Projects: *Projet d'Accès au Secteur de l'Electricité (PASEL, Access to Electricity Project)* and through the *Regional Off-Grid Electrification Project (ROGEP)*, of which Burkina Faso is one of 19 targeted countries.

The “*Projet d'accès aux Services Électriques*” – Project for Access to Electricity Services – PASEL (2014-2021) aims in particular at electrifying 220 localities in rural areas. It contains a \$1.5 million Lighting Africa sub-component dedicated wholly to decentralized energy access as part of a wider World Bank Electricity Sector Support Project. As part of this component, partnerships with local distributors have been established, and a lantern library initiative at rural schools is currently undergoing. To date, a total of 239 schools have benefited from this initiative in 8 regions of Burkina Faso and 161 additional schools will be reached in 2018. A consumer education campaign focused on energy efficiency and off-grid solar lamps meeting Lighting Global standards is also being prepared in collaboration with the Government of Burkina Faso⁷³.

The *Regional Off-Grid Electrification Project – ROGEP (2019-2030)* will aim to increase electricity access to households, businesses, and communities through modern off-grid electrification in the 15 Economic Community of West African States (ECOWAS) countries (Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, the Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo) as well as Cameroon, the Central African Republic (CAR), Chad, and Mauritania. ROGEP includes USD 150 million support in the form of credit and grant from the IDA and USD 74.7 million contingent recovery grant from the Clean Technology Fund to help the West African Development Bank (BOAD) and ECOWAS' Centre for Renewable Energy and Energy Efficiency (ECREEE) expand off-grid access to electricity. The project will provide market development assistance plus credit lines to regional and local financial institutions for off-grid clean energy projects⁷⁴. Market development assistance will include entrepreneurship technical and financial support for solar businesses, which show strong similarities with activities planned in the scope of Component 4 of the UNOPS/UNDP project. In order to avoid duplications and create synergies, the ROGEP focal point at the World Bank has already been contacted.

In addition, the World Bank is funding the *Burkina Faso Electricity Access Project (US\$50million; 2019- 2024)* that will focus on expanding electricity access in rural areas. It plans to electrify around 300 new localities in selected rural areas and the connection of 115,000 households, micro, small and

⁷³ Source: <https://www.lightingafrica.org/country/burkina-faso/>

⁷⁴ Source: <http://documents.worldbank.org/curated/en/541231554150233127/pdf/Western-Africa-Regional-Off-Grid-Electrification-Project.pdf>

medium-sized enterprises (MSMEs) and community infrastructures (school, health centres, etc.) to least-cost modern and reliable energy sources. Three project components will focus on mini-grids, namely: (1) Component 1: reinforcement of existing COOPELs based on commercial and technical performance; (2) Component 3: development, installation and operation of PV-based mini-grids with storage and connection of 25,000 households and MSMEs by competitively selected private concessionaires to provide reliable, sustainable and affordable electricity; and (3) Component 4: Capacity building for improved operational and commercial performance of COOPELs. Half of the funding will be used for the on-grid electrification. The total project cost is US\$90million, implying a shortfall of US\$40million (of which US\$15million is expected to be private investments).

The USD 12 million Energy and sustainable economic growth in the Mouhoun region project (ECED-Mouhoun Project) implemented by Cowater International (2017-2021) and funded by Affaires Mondiales Canada (AMC) aims at electrifying 15 rural villages and 30 health and social centres with solar energy. It also aims at creating revenue-generating activities (including a small industrial zone for 10 micro-enterprises) and providing micro-credits solutions to rural entrepreneurs. The third component aims at building capacity at the local, regional and national levels for the management of energy systems. While the target region of this project is outside the Liptako-Gourma region, the UNOPS/UNDP project will benefit from the experience and lessons learnt from this project, which also takes a bottom-up approach and focuses on creating economic growth at the local level.

The company SINCO is also implementing the USD 13.4 million “Eco-électrification dynamique dans le Nord et le Centre- Nord du Burkina Faso” project (2014-2019), which aims at (i) increasing rural electrification through grid extension, 5 solar mini-grids and 4,000 solar home systems, and (ii) increasing water supply through 7 solar PV plants for powering water pumps in the North and Centre-North regions of Burkina Faso. This project is mainly funded by the European Union (EUR 8 million), with co-financing from ONEA, AFD, SONABEL and others⁷⁵.

The Government of Denmark, through its Ministry of Foreign Affairs, is also financing a USD 8.3 million water, energy and agriculture project in fragile border areas between Mali, Burkina Faso and Niger. Projects are underway to support the building of climate-protected infrastructure in agriculture and increase access to clean water and energy. Synergies can be explored in regards to Component 2, Component 4 and Component 5.

PATRIP Foundation is also financing projects in West Africa, focusing on the border regions of Benin, Burkina Faso, Mali and Niger. PATRIP focuses on both the strengthening of social cohesion through dialogue and conflict resolution, as well as on providing vital community infrastructure particularly benefitting youth and women. Special emphasis is placed on the Liptako-Gourma region, which has been at the centre of destabilising incidents. The combination between dialogue and mediation measures with PATRIP's emphasis on infrastructure creates relevant opportunities to prevent conflict by bringing border communities closer together and providing them with a sense of participation and security where state presence is generally low. PATRIP is financed by the German Federal Foreign Office for a value of about USD 11.7 million and has partnerships with multiple NGOs (World Vision, CRS, Mercy Corps, Danish Refugee Council, Search for Common Ground, etc.). The project status is unknown but it will be interesting to explore the partnership between the two projects, particularly in regards to Component 1 and Component 5.

⁷⁵ Source: https://eeas.europa.eu/delegations/tchad/19714/appui-au-secteur-de-l%27energie_en

To summarize, the table below lists the main ongoing projects in Burkina Faso that have similarities of interventions with the components of this UNOPS/UNDP initiative. For each project, the need for coordination, synergies or lessons learnt with specific components of this project are highlighted.

Project title	Funding source	Funding (MUSD)	Period	Opportunities for coordination / synergies / lessons learnt				
				Component 1 - Institutional support	Component 2 - Installation of off-grid power supply solutions	Component 3 - Technical support for the improvement of regulatory frameworks	Component 4 - Private sector development	Component 5 - Promotion of productive energy and ecological investments
GEF-7 Africa mini-grids program	UNDP, AfDB, GEF	24.3	2021 - 2024					
Yeleen rural electrification project	AfDB, GCF	27.1	2019 - 2025					
Project for access to electricity services (PASEL)	WB	1.5	2014 - 2021					
Regional Off-Grid Electrification Project (ROGEP)	WB	224.7	2019 - 2030					
Burkina Faso Electricity Access Project	WB	50	2019 - 2024					
ECED-Mouhoun Project	AMC (Canada)	12	2017 - 2021					
Eco-electrification dynamique	EU, AFD, ONEA, SONABEL	13.4	2014 - 2019					
Water, energy and agriculture project in fragile border areas	Denmark	~8.3						
PATRIIP	German FFO	~11.7						

(2) Mali

a. Energy policy and regulatory framework

Mali has developed a National Renewable Energy Action Plan (NREAP) to increase the share of renewable energy in energy production and promote rural electrification through renewable energy, among other things. The objective by 2030 is to have 66.64% of the rural population served by off-grid systems (mini grids and autonomous systems) of renewable energy-based electricity services. The

installed capacity of off-grid renewables should increase from 20MW in 2010 to over 600MW by 2030, a thirtyfold increase over the period. Ambitious targets have also been set for ethanol and biodiesel⁷⁶.

b. Institutional structure

Mali's national grid is owned and operated by Energie du Mali SA (EDM SA) which supplies 35 towns, including Bamako. EDM SA also manages 30 isolated centres equipped with diesel generators and two centres supplied by Côte d'Ivoire.

The Energy and Water Ministry and its affiliated agencies is in charge of the energy sector in Mali.

The Malian Agency for Domestic Energy and Rural Electrification (Agence Malienne pour le Développement de l'Énergie Domestique et de l'Électrification Rurale - AMADER) is in charge of rural electrification for generation centres below 250 kW and is the regulator for rural electrification in accordance with the reference framework of rural electrification adopted in 2003.

The Malian Agency for Renewable Energy (Agence des Énergies Renouvelables du Mali – AER-Mali) promotes widespread use of renewable energy in the country to enable sustainable socio-economic development. It was created from a redefinition of the mandate of the former National Centre for Solar and Renewable Energy (CNESOL).

The National Agency for Biofuels Development (Agence Nationale de Développement des Biocarburants - ANADEB) formulates and implements national biofuels policy and ensures the regulation of the bioenergy sub-sector. The Electricity and Water Regulation Commission (Commission de Régulation de l'Électricité et de l'Eau - CREE) regulates the electricity and water sectors. The commission is independent from government operators, with juridical powers and financial autonomy. It lies under the supervision of the Prime Minister's Office.

c. Baseline of programmes and projects on access to clean energy in rural areas

The GEF-funded Promoting Sustainable Electricity Generation in Malian Rural Areas through Hybrid Technologies project (2016-2020) implemented by UNDP aims at promoting the development of small-scale renewable energy/PV-based mini-grids in a hybrid system with multifunctional platforms to target off-grid rural electrification. The project supports the establishment of an enabling environment for the implementation of these hybrid systems and the development of a suitable business model and financial instruments for their viability and replication. It has leveraged significant private sector investment to pilot 15 villages having an initial total installed capacity of 147 kW of PV. The project is funded by a USD1.1 million grant from the GEF and USD 24 million co-financing.

The GCF-funded Mali solar rural electrification project (USD 37.8 million, 2019-2023) implemented by the West African Development Bank (BOAD) aims at increasing the rural population's access to electricity in 50 identified communities by installing 3.78 megawatts of isolated solar PV mini-grid systems⁷⁷. In addition this project aims at strengthening the capacity of public institutions engaged in rural electrification; catalysing the development of an efficient solar market that will enable Mali to meet its renewable energy and greenhouse gas (GHG) reduction targets; contributing to the regulatory framework through capacity-building and putting in place an institutional framework to further promote the deployment of renewable energy. The funding is composed of a 32 million USD loan to the government of Mali for the installation of mini-grids, and the remaining as a grant for capacity building and technical assistance. A second tranche is expected to build 20 additional mini-grids later on.

⁷⁶ Source: Mali National Action Plan for Renewable Energies

⁷⁷ Source: <https://www.greenclimate.fund/project/fp102>

The Rural Electrification Hybrid Systems Project – SHER (2014-2019) funded by the World Bank, aims at improving access to modern electricity services in rural areas and improving production of renewable energy. Over 5 years, it successfully realized over 9,000 connections and provided over 4,400 solar home systems in the Kayes, Koulikoro, Sikasso, Ségou et Mopti regions. A new phase was launched in 2019, with the aim to install hybrid solar/diesel mini-grids in 50 villages of the same regions. The project also focuses on the development of off-grid lighting and the distribution of portable solar lanterns and pico-PV materials certified “Lighting Africa”; in rural areas.

In 2013, the Global Partnership on Output-Based Aid (GPOBA) approved a grant for USD 5 million to co-finance Mali's Rural Electrification Hybrid System Project - GPOBA, which provides incentives to private operators to increase access and make connection packages affordable to the rural poor. The project targets 12,000 poor households (approximately 130,000 people) in rural, off-grid, remote areas that have been unable to get a mini-grid/SHS connection due to high investment cost and that currently rely on candles, batteries or kerosene. The project has two components—subsidies for investment in off-grid solutions, and the independent verification of outputs.

Mali is one of the six pilot countries in the Scaling Up Renewable Energy Program in Low Income Countries (SREP) funded by the Strategic Climate Fund (SCF), one of the two Climate Investment Funds (CIF). SREP aims to scale up the deployment of renewable energy solutions and expand renewable markets in the world's poorest countries. The AfDB is supporting the SREP countries as they coordinate with their respective private sectors, civil societies and other communities to develop SREP investment plans. As an example, SREP recently contributed to the financing of the abovementioned SHER project.

The project for hybrid production and rural energy access (PHARE) launched in 2016 is sponsored by the Malian agency for the development of domestic energy and rural electrification (AMADER). Financed by the European Union (grant, EUR 18 million), AFD (loan, EUR 20 million) and the Malian government (EUR 1 million), it aims at promoting the use of renewable energy resources and increasing the involvement of the private sector in providing access to electricity in rural regions. The project's overarching objective is to provide a reliable, affordable, permanent supply of electricity to some 156,000 people through 60 hybrid PV/diesel mini-grids located in isolated, rural villages in Mali in the regions of Kayes, Koulikoro, Sikasso, Ségou, Gao, Kidal, Bamako.

AMADER also received a USD 19 million funding from the Arab Bank for Economic Development in Africa (BADEA) and Abu Dhabi Fund for Development (ADFD) in the scope of the Rural Electrification by Hybrid Systems Project - PERSHY3 (2017 – 2020). This project aims at the electrification by hybrid systems of 32 localities in rural areas.

The Solar Energy for Rural Development Project under Reverse Linkage project (USD 15 million, 2017-2021) is financed by the Islamic Development Bank and aims at enhancing the capacity of Mali in rural electrification by establishing a sustainable model for rural electrification, which provides affordable and reliable electricity to rural communities in the country. The project will increase the installed capacity of solar energy by 14% from 15 MW in 2015 to 17.42 MW in 2021. In addition, it will increase the electrification rate in the rural areas of the country by 1.5 % to reach 19.5 % by 2021.

The project PRODER – Phase 2 involves the construction of solar PV / diesel hybrid plants to replace multifunctional platforms (village women's mills) used for pre-electrification in 13 villages. The project is financed by the West African Economic and Monetary Union (UEMOA).

The Government of Denmark, through its Ministry of Foreign Affairs, is also financing a USD 8.3 million water, energy and agriculture project in fragile border areas between Mali, Burkina Faso and Niger. Projects are underway to support the building of climate-protected infrastructure in agriculture and increase access to clean water and energy. Synergies can be explored in regards to Component 2, Component 4 and Component 5.

PATRIP Foundation is also financing projects in West Africa, focusing on the border regions of Benin, Burkina Faso, Mali and Niger. PATRIP focuses on both the strengthening of social cohesion through dialogue and conflict resolution, as well as on providing vital community infrastructure particularly benefitting youth and women. Special emphasis is placed on the Liptako-Gourma region, which has been at the centre of destabilising incidents. The combination between dialogue and mediation measures with PATRIP's emphasis on infrastructure creates relevant opportunities to prevent conflict by bringing border communities closer together and providing them with a sense of participation and security where state presence is generally low. PATRIP is financed by the German Federal Foreign Office for a value of about USD 11.7 million and has partnerships with multiple NGOs (World Vision, CRS, Mercy Corps, Danish Refugee Council, Search for Common Ground, etc.). The project status is unknown but it will be interesting to explore the partnership between the two projects, particularly in regards to Component 1 and Component 5.

To summarize, the table below lists the main ongoing projects in Mali that have similarities of interventions with the components of this UNOPS/UNDP initiative. For each project, the need for coordination, synergies or lessons learnt with specific components of this project are highlighted.

Project title	Funding source	Funding (MUSD)	Period	Opportunities for coordination / synergies / lessons learnt				
				Component 1 - Institutional support	Component 2 - Installation of off-grid power supply solutions	Component 3 - Technical support for the improvement of regulatory frameworks	Component 4 - Private sector development	Component 5 - Promotion of productive energy and ecological investments
Promoting Sustainable Electricity Generation in Malian Rural Areas through Hybrid Technologies	UNDP, GEF	1.1	2016 - 2020					
Mali solar rural electrification project	UEMOA, GCF	37.8	2019 - 2023					
Rural Electrification Hybrid Systems Project – SHER	WB, GPOBA	53	2014 - 2019					

Rural Electrification Hybrid Systems Project - PERSHY3	BADEA, ADFD	19	2017 - 2020					
Project for hybrid production and rural energy access (PHARE)	EU, AFD, Malian Govt	39	2016 - 2020					
Solar Energy for Rural Development Project under Reverse Linkage	IDB	15	2017 - 2021					
PRODER – Phase 2	UEMOA							
Water, energy and agriculture project in fragile border areas	Denmark	~8.3						
PATRIP	German FFO	~11.7						

(3) Niger

a. Energy policy and regulatory framework

The Government of Niger liberalized the power sector with the approval of the Electricity Act of May 2016, which ended the monopoly of the national utility NIGELEC by opening up the sector to private sector participation, particularly in generation and in rural electrification. The Electricity Act also enacted the creation of the Energy Sector Regulatory Authority of Niger (ARSE) and the Nigerien Agency for the Promotion of Rural Electrification (ANPER).

In September 2016 Niger signed the Paris Climate Agreement whereby its Nationally Determined Contributions (NDCs) set its unconditional reduction of carbon emissions at 3.5% by 2030. Mitigation measures to achieve this include upscaling of sustainable land management practices and doubling the renewable energy mix to reach 30% by 2030.

In May 2017, the Government of Niger adopted the Strategy for Sustainable Development and Inclusive Growth – Niger 2035 (SDDCI) whose first implementation plan, the Plan for Economic and Social Development 2017 – 2021 (PDES) was adopted in September 2017. The PDES is articulated around five axes: (a) cultural renaissance; (b) social development and demographic transition; (c) acceleration of economic growth; (d) governance and security; and (e) sustainable management of the environment. To accelerate the economic growth and social development, the PDES builds on the revitalization and modernization of the rural world focusing on increased agricultural productivity, private sector participation, and empowerment of women and youth employment. The achievement of the PDES objectives requires the development of rural electrification and renewable energy.

To speed up access to electricity, the Government of Niger has adopted in 2018 a National Electrification Policy Document (NEPD) and an ambitious National Electrification Strategy (NES), which are formulated around two main pillars: (a) on the demand side, to ensure universal access to electricity for all Nigeriens by 2035 in line with the SDDCI - Niger 2035 and make electricity the driver and enabler of the modernization and development of rural areas and (b) on the supply side, promote public-private partnerships (PPPs), with a view to tapping into domestic energy resources to generate 80 percent of the supply by 2035.

In 2019, a decree specified the modalities for the installation of off-grid rural electrification projects in Niger. In addition, the Ministry of Energy is currently preparing a Master Plan for Electricity Access (PDAE) that will identify all villages that need to be electrified by 2035, as well as the optimal technology and financing plan.

b. Institutional structure

The Ministry of Energy is responsible for coordinating and implementing energy policy in Niger, which takes place across a variety of agencies and government entities. The Nigerian Rural Electrification Promotion Agency (ANPER), created in 2013, is responsible for developing and implementing strategies for expanding electrification in rural portions of the country. The Regulatory Authority of the Energy Sector (ARSE), created in 2015, regulates the electricity sector and advises the legislature regarding the development of laws and regulations.

The national utility, the Nigerien Electricity Company (NIGELEC) is a semi-public company that is 95 percent owned by the Government of Niger. Niger was one of the first countries across the world to consider renewable energy technologies as a solution to its energy needs. This dates back to the 1960s, when Niger set up the Solar Energy Office (ONERSOL), later renamed the National Solar Energy Centre (CNES) and Agence Nationale d'Energie Solaire (ANERSOL) in 2018. ONERSOL was founded to undertake applied renewable energy research, provide diagnostic studies on renewable energy technology use, and run training programmes on renewable energy systems. Yet this ambitious and promising programme did not achieve its intended goal of creating a strong renewable energy technical capability for the West African region. This was because financial resources for sustaining the programme dried up and priorities shifted. ANERSOL has been recently strengthened by the Government of Niger with support from ECREEE to increase its capacity and effectiveness in achieving its mandate of promoting and developing solar energy in all sectors of the Nigerien economy.

Besides ANERSOL, Niger also has an expanding training offer in the field of renewable energy, in particular PV technology. Four universities in Niger already offer degree programs and classes that provide relevant training for the energy sector, including renewable energy. Niger also has both public and private trade schools that provide training for solar technicians. Finally, APE-Solaire, the National Association of Solar Professionals, facilitates apprenticeships for solar technicians with solar companies in Niger.

c. Baseline of programmes and projects on access to clean energy in rural areas

As the primary initiative in off-grid energy by the Government of Niger (GON), the Niger Solar Electricity Access Project (NESAP) (USD 49 million, 2017 – 2024) supported by the World Bank focuses on developing off-grid solar in Niger. NESAP consists of the following four components: market development of stand-alone solar systems; rural electrification through mini-grid development; solar PV hybridization of and expansion of access to existing thermal mini-grids; and implementation support and technical assistance.

The African Development Bank is supporting the implementation of the USD 70 million Rural, Semi-urban and Urban Electrification Project (PEPERN) in Niger. Started in 2016, the overall goal of PEPERN is to develop access to electricity with a view to improving the living conditions of the population in urban centres and check rural exodus by fostering the creation of better living conditions for rural dwellers. While most of the project activities are grid-oriented, it includes an off-grid component which aims at conducting a feasibility study for the electrification of 100 rural villages. PEPERN's interventions cover the eight regions of Niger.

Off-grid electrification is increasingly supported by other donors, including India Exim Bank (50 villages solar electrification project), ECOWAS Bank for Investment and Development (EBID, US\$10 million for solar electrification), BOAD (47 villages with PV/diesel hybrid systems by 2019), IsDB (off-grid solar PV for 27 big rural towns), and International Renewable Energy Agency (IRENA, 100 villages) with Abu Dhabi Fund for Development (ADFD).

The African Development Bank, through its Sustainable Energy Fund for Africa (SEFA) is also financing technical assistance to develop the regulatory framework of PPPs in rural electrification as well as the identification of initial investments with hybrid mini-grids.

The Government of Denmark, through its Ministry of Foreign Affairs, is also financing a USD 8.3 million water, energy and agriculture project in fragile border areas between Mali, Burkina Faso and Niger. Projects are underway to support the building of climate-protected infrastructure in agriculture and increase access to clean water and energy. Synergies can be explored in regards to Component 2, Component 4 and Component 5.

PATRIP Foundation is also financing projects in West Africa, focusing on the border regions of Benin, Burkina Faso, Mali and Niger. PATRIP focuses on both the strengthening of social cohesion through dialogue and conflict resolution, as well as on providing vital community infrastructure particularly benefitting youth and women. Special emphasis is placed on the Liptako-Gourma region, which has been at the centre of destabilising incidents. The combination between dialogue and mediation measures with PATRIP's emphasis on infrastructure creates relevant opportunities to prevent conflict by bringing border communities closer together and providing them with a sense of participation and security where state presence is generally low. PATRIP is financed by the German Federal Foreign Office for a value of about USD 11.7 million and has partnerships with multiple NGOs (World Vision, CRS, Mercy Corps, Danish Refugee Council, Search for Common Ground, etc.). The project status is unknown but it will be interesting to explore the partnership between the two projects, particularly in regards to Component 1 and Component 5.

To summarize, the table below lists the main ongoing projects in Niger that have similarities of interventions with the components of this UNOPS/UNDP initiative. For each project, the need for coordination, synergies or lessons learnt with specific components of this project are highlighted.

Project title	Funding source	Funding (MUSD)	Period	Opportunities for coordination / synergies / lessons learnt				
				Component 1 - Institutional support	Component 2 - Installation of off-grid power supply solutions	Component 3 - Technical support for the improvement of regulatory frameworks	Component 4 - Private sector development	Component 5 - Promotion of productive energy and ecological investments
Niger Solar Electricity Access Project (NESAP)	WB	49	2017 - 2024					

Rural, Semi-urban and Urban Electrification Project (PEPERN)	AfDB	70	2016 -					
SEFA support on green mini-grids	AfDB							
Regional Off-Grid Electrification Project (ROGEP)	WB	224.7	2019 - 2030					
Rural solar electrification project of 50 villages	India Exim Bank	9.27						
Solar electrification project	EBID	10						
Electrification of 47 villages	BOAD	20						
Electrification project of 100 villages	ADFD	20						
Electrification of 27 big rural towns	IsDB							
Développement Socio-économique des Femmes dans les communautés rurales de la région de Maradi et de Tahoua au Niger grâce aux Energies Renouvelables (DESFER).	Plan International							
Water, energy and agriculture project in fragile border areas	Denmark	~8.3						
PATRIIP	German FFO	~11.7						

D. Lessons learned

(a) UNOPS Experience

The Rural Renewable Energy Project (RREP) funded by DFID and implemented by UNOPS in close collaboration with the Sierra Leone Ministry of Energy, aims to accelerate electrification through mini grids in areas and localities that are beyond the reach of Sierra Leone's national grid. The RREP is based on a strategy of participation and active involvement of the private sector in the management and maintenance of mini solar networks through public-private partnerships (PPPs), with the following structure:

- Lot 1 includes 50 6kWp PV systems to power community health centres (installed by UNOPS in 12 months);
- Lot 1+ includes the extension of the 50 systems to small mini-grids by increasing capacity to 16, 26 or 36 kWp and installing low voltage distribution networks to connect nearby communities (installed by UNOPS);
- Lot 2 includes the development of mini-grids in 40 large communities based on a PPP structure, where UNOPS implements distribution networks and private partners finance and implement power generation assets;
- Lot 3 includes building government capacity and developing mini-grid regulation to provide an enabling environment and sufficient legal protection to attract private investors.

A two-stage mini-grid tender (EOI/RFP) was developed within the framework of the RREP on the basis of the requirements listed above. A total of 33 companies have expressed interest. At the end of the tendering process, contract negotiations were successfully concluded and PPP contracts were signed between the Ministry of Environment and three private companies.

The main objective of the tender for the RREP mini-grid was to create a sustainable market for mini-grids based on viable business models that can operate without relying on long-term subsidies. Indeed, some governments transform loans from international donors into grants for similar projects, increasing national debt.

The main lessons learned from the implementation of the RREP call for tenders are as follows:

- Ownership of the project by the Government of Sierra Leone:
 - The Government of Sierra Leone fully assumes responsibility for the implementation of the project, and the decisions taken are implemented with full political support, despite administrative delays that sometimes slow down the implementation process
- Site selection:
 - The selection of sites was predetermined at the beginning of the project through a list drawn up by the Government. These sites were chosen mainly for social reasons. It would have been preferable for the long-term success of the project to select sites based mainly on mini-grid specific aspects and thus make economic sustainability more likely.
- Resource allocation:
 - The condition that funds made available by DFID can only enter the project through the government, and only in the form of assets and services, makes implementation more difficult than if the funds could be used more freely. For example, it is not possible to pay subsidies to operators, which would allow them to obtain directly the equipment they use (e.g. distribution assets).
- Implementation of batch 1+:
 - It has been demonstrated that it is not ideal for systems to be fully implemented and then outsourced to private operators for long-term operation. Heavy administrative procedures increase the risk. For example, batteries are not stored or used properly for a long period of time, resulting in economic losses. The process of transferring an already installed system with such a degree of complexity is too laborious for the size of the project.

- UNOPS procurement expertise can be used mainly in the procurement of equipment for mini-grids, as well as in the installation of distribution networks. Ideally, however, the design and installation of power plants should be carried out by private operators (see lessons learned in other countries above).
- The fact that the project must use escrow accounts to ensure that sufficient funds are available for the necessary replacement investments of the assets in Lot 1+ (which are almost entirely funded by grants) complicates management because of the long-term involvement of the Ministry of Energy.
- Technical assistance:
 - The implementation of the call for tenders has clearly demonstrated that the support of tenderers/operators through technical assistance is very well received by the private sector and greatly increases trust between actors. UNOPS technical assistance activities under the RREP are necessary for both the government and private operators to carry out the project.

(b) UNDP Experience

In response to the strong growth in demand for energy services for poverty reduction, including NEPAD's ambitions (access to energy for 35% of African populations in disadvantaged rural areas), UNDP initiated a Regional Energy for Poverty Reduction Program (PREP) from 2003-2008. This program was structured around two essential dynamics: (i) the strong political mobilization of the international community (United Nations; European Union; etc.) and African institutions (NEPAD, SADC, ECOWAS, ECA) and (ii) the existence of a successful experience of access to basic energy services centred on multifunctional platforms (TFPs) initiated in Mali with the help of UNDP Mali and UNIDO. The PREP was intended to cover, on a phased approach starting in West Africa, a total of 12 countries from 2003 to 2008 (Mali, Senegal, Burkina Faso, Guinea, Togo, Benin, Ghana, Cameroon, Rwanda, Tanzania, Zambia, Malawi). Building on the achievements and tremendous political momentum resulting from the Multifunctional Platforms projects in West African countries over the past decade, the program aims to unlock the energy-poverty trap in which the poor, especially women in sub-Saharan Africa, are caught. It seeks to bring about policy changes to improve access to energy services for the region's poor in order to increase the rate of achievement of the NEPAD Goals and the Millennium Development Goals, particularly those related to poverty, gender and energy services. The three main objectives of the regional program were: Objective I. The creation of a South-South knowledge network for the exchange of experiences, knowledge and best practices across the region on effective planning, management and growth of decentralized rural energy systems or enterprises. Objective II. (Policy analysis and advocacy) - The integration of energy poverty issues in rural areas into local, national and regional poverty reduction policies/strategies Objective III. Pilot approach to demonstration and capacity building - Catalyse the development and launch of national programs for the promotion of rural energy enterprises based on TFPs and adapted to the local environment reflecting the objective of NEPAD.

National experiences

Regarding Niger, two projects to promote people's access to energy services have been implemented in recent years, namely:

- The Multifunctional Platform Development Project (MFPD), whose pilot phase (aimed at installing 40 MFPDs) was followed by a more ambitious project aimed at installing 500 MFPs; this phase is currently being implemented and is generating a lot of interest among the population;
- The project Integration of the reduction of greenhouse gas emissions into the PRASE-GEF Rural Energy Access Program of Niger, implemented in the commune of Safo (Maradi Region), at the same time as the PASE-SAFO project financed by the European Union was being implemented. These two projects promoted the use of solar energy for social purposes (electrification, cold chain) and production needs (small irrigation by solar pumping). They also introduced, on a pilot scale, the use of biofuel (neem oil) for the operation of PTFMs, which, once developed, could make a significant contribution to the fight against desertification. Finally, the two projects made it possible to

propose and adopt texts that have changed the institutional and regulatory framework on rural electrification in Niger.

Regarding Mali, recent projects implemented include:

- The MLI/96 - 003 Project "Improved Environmental Management: Enhancing the Role of Women in the Promotion of New and Renewable Energy", implemented from 1996 to 2001 with UNDP assistance, is a pilot program implemented in this context to promote greater participation of women in the activities of the new and renewable energy sector. Several actions have been carried out and several meetings have made it possible since 2004 to focus actions around the Promotion of New and Renewable Energies for the Advancement of Women Project "PENRAF".
The Project capitalizes on the positive impacts of the previous steps to launch a new dynamic focused on meeting basic needs through the Renewable Energies (REN) of the municipalities. This is in order to set up clean energy services adapted to these rapidly expanding environments following rapid and poorly controlled urbanization.
- The Project for the Promotion of New and Renewable Energies for the Advancement of Women "PENRAF" 2010 to 2016, which was therefore the consolidation phase of a project that had a very positive impact on the beneficiaries (improvement of living conditions and income and the promotion of women) and the protection of the environment (enhancement of natural resources, reduction of greenhouse gas emissions, fight against desertification, etc.). As new activities, this phase aims to strengthen actions in the regions of Koulikoro, Ségou and Sikasso and to extend them to the region of Mopti, develop an ENR development strategy, strengthen the participation of the private sector, NGOs and women's groups, take into account decentralization and provide a new type of institutional support to CNESOLER.
- After a pilot phase of the Multifunctional Platforms project (from 1995 to 1998), an extension phase (from 1999 to 2004), a transitional phase (2005-2007) and another dissemination phase (from 2008 to 2013), Mali, on the strength of the success recorded in the development and dissemination of more than one thousand multifunctional platforms (PTFM), has set itself the ambition of achieving a real change of scale, starting in 2015. This "National Multifunctional Platform Program (PTFM)" is the result of a coherent process of experimentation and dissemination of multidimensional equipment modules (Multifunctional Platforms) in Mali to alleviate the work of women in particular, improve the living conditions of rural populations in general and women in particular and reduce poverty, through access to driving force and subsequently to electricity and drinking water.
- The project "Promotion of sustainable electricity production in rural areas of Mali through hybrid technologies", which started in 2017 and aims to promote the development of small renewable energy/photovoltaic (PV) grids in a hybrid system with multifunctional platforms (MFPs) to ensure off-grid rural electrification. The project will create an enabling environment for the development of these hybrid systems and develop a business model and financial instruments adapted to their viability and replication. This will be achieved by mobilizing a significant private sector investment over the four-year implementation period to implement the project in 15 pilot villages, with an initial total installed capacity of 147 kW of PV energy. During the project period, these 15 pilot villages will produce a total of 416 MWh of electricity. In the future, they will have an annual production of 244 MWh, which will be maintained over the expected 20-year lifetime of the PV systems, avoiding a cumulative emission of 4,216 t CO₂.

Regarding Burkina Faso:

- Since 2004, UNDP has supported the country in the implementation of two projects focusing on access to energy. In Burkina Faso, UNDP joined the Government in initiating a pilot project and then programs to develop the dissemination of the "Multifunctional Platforms (MFPPs) for the fight against poverty in Burkina Faso", the main objective of which was "to contribute simultaneously to the eradication of poverty, the significant reduction of inequality and

exclusion through access to modern energy services provided by the MFPP". Between 2004 and 2015, this partnership made it possible to provide around 1,500 central villages (and more than 3,000 polarized peripheral villages) with the PTFM tool, i.e. less than 50% of eligible rural localities. The changes in living conditions observed due to PTFMs are reducing women's drudgery, saving time and reducing the distances travelled to obtain grain milling, battery charging, etc. These changes are accompanied by the expansion of women's entrepreneurship, the increase in the incomes of women in particular and of rural populations in general. The contribution to local development and empowerment for the recovery of the beneficiary populations is an important asset for improving social cohesion. This project has enabled UNDP to capitalize on experiences on social mobilization around access to energy.

- Since 2016, UNDP has also been supporting the Government of Burkina Faso in the implementation of a biofuel project called "project to promote jatropha curcas as a sustainable agro-fuel source in Burkina Faso". The objective of the project is to develop and promote a profitable production model and the use of jatropha as an agro-fuel at the national level. It will help reduce the use of diesel and contribute to the reduction of GHG emissions in transportation and energy production. This project will install 15 local presses capable of producing 35,000L of jatropha oil/year to replace diesel fuel used in PTFM mills. A bill is proposed by this bill to encourage private investment in agro fuels.
- Finally, a project document on rural solar electrification is being prepared to support the government in deploying 25 off-grid mini solar grids in rural areas in eco-villages and to limit the risks for private investment in the deployment of mini grids in rural areas.

E. Potential intervention areas

(a) Burkina Faso/Niger Border

i. Tillabéri Region/Sahel Region in Burkina Faso

The following border municipalities in Burkina Faso and Niger, members of the *Groupement Communal de Coopération Transfrontalière*:

- In Burkina Faso: communes of Boundoré, Titabé, Mansila, Tankougounadié, Falagountou, Sampelga, Seytenga, Markoye, Tin-Akoff
- In Niger: communes of Bankilaré, Dargol, Diagourou, Gorouol, Gotheye, Mehanna, Kokoro

ii. Tillabéri Region/East Region in Burkina Faso

- The Makalondi (Niger) / Kantchari (Burkina Faso) axis
- The Tamou (Niger) / Botou (Burkina Faso) axis

(b) Mali/Niger Border

The cross-border cooperation corridor on the Ayorou - Ouatagouna axis including the villages of Koutougou, Labezzanga, Kongokiré

(c) Burkina Faso/Mali Border

i. Mopti Region/Sahel Region in Burkina Faso

- The Djibo (Burkina Faso) / Mondoro (Mali) axis

ii. Mopti Region/Northern Region in Burkina Faso

- The Thiou (Burkina Faso) / Koro (Mali) axis

F. Project results framework

Note: The indicators will be subject to change in consultation with SIDA as a result of field analyses conducted at the beginning and throughout the project.

This project will contribute to the following Sustainable Development Goal (s): SDG 7-Ensure access to affordable, reliable, sustainable and modern energy for all; SDG 13 – Take urgent action to combat climate change and its impacts				
	Objective and Outputs Indicators	Baseline	Mid-term	End of Project Target
Project Overall Objective	Contribute to the economic and social development of communities in the Liptako-Gourma region through reliable and sustainable access to clean energy in rural areas			
	Objective Indicator 1: Number of people having increased access to sustainable clean energy (disaggregated by m/f)	0	14,000 <i>(at least 40% women)</i>	30,000 <i>(at least 40% women)</i>
	Objective Indicator 2: Annual direct project GHG emissions mitigated (tCO2e)	0		
	Objective Indicator 3: Number of new businesses created as a result of the project activities (disaggregated by m/f, age groups of business owners)	0		
Project Component 1 (UNDP)	Institutional support			
	Indicator 1.1: Number of inclusive national coordination platforms on off-grid clean energy created/strengthened and operational	0	3	3
	Indicator 1.2: Minimum share of women participation in the national coordination platforms on off-grid clean energy in each country (in %)	0	33	33
	Indicator 1.3: Number of meetings held by the national coordination platforms on off-grid clean energy in each country	0	8	12
	Indicator 1.4: Number of energy information, modelling and monitoring systems operational at the regional level	0	1	1
	Indicator 1.5: Number of energy information, modelling and monitoring systems operational at the national level	0	3	3
Project Component 2 (UNOPS)	Installation of off-grid power supply solutions			
	Indicator 2.1: Percentage of population with awareness around clean energy issues (disaggregated by m/f and age group)		<u>50%</u>	<u>90%</u>
	Indicator 2.2: Number of additional people with access to clean, affordable, reliable and economically viable energy services (disaggregated by m/f and age group)	0		
	Indicator 2.3: Number of street lights operating as a result of the project activities	0		
	Indicator 2.4: Hours of hospital access to electricity daily			
	Indicator 2.5: Percentage of employees of grid operator contractors who are women	0	<u>30%</u>	<u>50%</u>
Project Component 3 (UNDP)	Support for the improvement of the regulatory frameworks			
	Indicator 3.1: Number of national DREI diagnosis completed	0	3	3
	Indicator 3.2: Number of national regulatory reform packages developed and considered by the governments for enactment	0	2	3
Project Component 4 (UNOPS)	Support for the development of the local private sector in the domain of renewable energy mini-grids			
	Indicator 4.1: Amount invested by the private sector (disaggregated by m/f, age groups)	0		

	Indicator 4.2: Number of private companies involved in the targeted areas (disaggregated by m/f owner)			
	Indicator 4.3: Number of companies created in the renewable energy sector (disaggregated by m/f, age groups)	0	<u>2</u>	<u>10</u>
	Indicator 4.4: Number of trainings held for local companies (disaggregated attendants by m/f, age groups)	0	<u>1</u>	<u>5</u>
	Indicator 4.5: Number of companies attending the trainings (disaggregated by m/f owner, owners' age group)	0	<u>5</u>	<u>25</u>
Project Component 5 (UNDP)	Support the development of revenue-generating activities in the cross-border regions of Liptako-Gourma			
	Indicator 5.1: Number of gender-responsive technical and economic analyses to demonstrate the business case for clean cooking technologies in the Liptako-Gourma region	0	1	1
	Indicator 5.2: Number of clean cooking production centers established in the Liptako-Gourma region	0	3	3
	Indicator 5.3: Number of permanent jobs created as a result of the clean cooking activity in this project, disaggregated by gender and age	0	30 <i>(at least 80% women, at least 50% in the 18-35 age group)</i>	30 <i>(at least 80% women, at least 50% in the 18-35 age group)</i>
	Indicator 5.4: Number of people generating a sustainable additional income as a result of the clean cooking activity in this project, disaggregated by gender and age	0	75 <i>(at least 80% women, at least 50% in the 18-35 age group)</i>	75 <i>(at least 80% women, at least 50% in the 18-35 age group)</i>
	Indicator 5.5: Number of households capacitated in appropriate use of clean cooking technologies and having access to technologies	0	4,000	10,000