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Project Information Document/ Integrated Safeguards Data Sheet (PID/ISDS)

Concept Stage | Date Prepared/Updated: 03-Feb-2020 | Report No: PIDISDSC21054



BASIC INFORMATION

A. Basic Project Data

Country Comoros	Project ID P162783	Parent Project ID (if any)	Project Name Comoros Solar Energy Integration Platform (P162783)
Region AFRICA	Estimated Appraisal Date Mar 12, 2020	Estimated Board Date May 11, 2020	Practice Area (Lead) Energy & Extractives
Financing Instrument Investment Project Financing	Borrower(s) Government of the Union of Comoros	Implementing Agency SONELEC	

Proposed Development Objective(s)

Improve the commercial performance of SONELEC and its capacity to dispatch variable renewable energy.

PROJECT FINANCING DATA (US\$, Millions)

SUMMARY

Total Project Cost	40.00
Total Financing	40.00
of which IBRD/IDA	40.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Development Association (IDA)	40.00
IDA Grant	40.00

Environmental Assessment Category

B - Partial Assessment

Concept Review Decision

Track II-The review did authorize the preparation to continue



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Other Decision (as needed)

B. Introduction and Context

Country Context

Comoros is a fragile and conflict-affected country with considerable development challenges. The small island state, composed of three islands, namely Grande Comore (Njazidja), Anjouan, and Mohéli, faces numerous challenges including political instability, a long-term negative growth trajectory in income per capita, limited institutional capacity, and poor governance. The country's history presents the main characteristics of a low-growth/poor-governance fragility trap. In the three decades since independence (1975), it has experienced several coups, demands for more autonomy with a separatist movement in Anjouan, and frequent changes in governments. Regular changes in the management of parastatals, weak institutional capacity, and poor governance combined with the political instability have taken a severe toll on the Government of Comoros' (GoC) ability to deliver high quality basic services. Acute underinvestment in services, infrastructure, education, and the productive sectors of the economy were the outcome.

Past political tensions are giving way to newfound, relative stability. After more than a decade of elevated tensions, a negotiated resolution between the separatist island of Anjouan and the Union in 2001 was followed in May 2009 by the popular approval of a constitutional revision. This paved the way towards gradual political normalization and allowed for two democratic transitions of power in the last decade. The presidential elections in early 2016 were considered broadly fair, transparent, and peaceful. The new president, Azali Assoumani, took office in May 2016 and appointed a coalition government in early June 2016.

While progress has been made on poverty reduction, more remains to be done. Densely-populated Comoros remains a fragile and poor country. The current population is estimated at 0.8 million (July 2016) and Comoros' gross domestic product (GDP) per capita at US\$645 (2015). Compared to over a decade ago, the poverty incidence has slightly improved, but progress has been uneven. It varies considerably across regions and is typically higher in rural areas and on the island of Anjouan. Recent urban migration may have further exacerbated poverty in crowded urban suburbs. High dispersion in the distribution of welfare exists among geographic areas.¹ Comoros has a small and undiversified economy that has repeatedly suffered by political shocks. In 2013 – 2015 severe shortages in electricity supply and sluggish progress in the implementation of structural reforms presented a drag on all sectors of the economy. In such a situation, the success of reforms, such as improving the reliability of electricity supply, and efforts to gradually restore confidence in the GoC's ability to manage the complex political and economic transition from fragility to resilience is key.²

The new GoC has improved energy services high on its agenda. The last World Bank energy sector diagnostic was prepared in 2011-12. It was summarized in the Sector Policy Note adopted by the GoC ("Document de politique de

¹ Macro-Poverty Outlook, Comoros, October 2016.

² Macro-Poverty Outlook, Comoros, October 2016.



l'énergie électrique et des produits pétroliers de l'Union des Comores") in July 2012, followed by a more detailed Energy Sector Strategy and respective Action Plan financed by the European Union (EU) in 2013. Overall, the GoC shows a sense of urgency and political momentum for change. The executive authorities want to transform the country's economy by fostering the development of the private sector (e.g., tourism, fisheries, agro-industry) through the development of infrastructure (e.g., transport, telecom) and a better functioning financial sector. In the case of the energy sector, the GoC welcomes the Bank's efforts under the Electricity Sector Recovery Project (ESRP, P131659) to further improve the power company's management and operational performance, amongst others.

Sectoral and Institutional Context

Key sector stakeholders: While the Energy and Water Directorate (DGEME) is the lead government agency overseeing the energy sector, operational responsibility is in the hands of two public utilities, namely MAMWE (Gestion de l'Eau et de l'Electricité aux Comores, providing electricity to the islands of Grande Comore and Mohéli), and EDA (Electricité d'Anjouan, serving the island of Anjouan). The two companies are vertically integrated, with responsibility for generation, transmission, and distribution in their respective service areas. While there are no interconnections between the islands, a recent effort from GoC envisages the integration of both utilities into a single entity. However, the above overall responsibilities aside, there is no regulatory agency and no adequate policy and regulatory framework which defines clear roles and responsibilities for each institution and their respective accountabilities and mandates.

Sector profile and primary energy use: Comoros' energy sector is characterized by increasing reliance on imported fossil fuels, a high electricity tariff, daily electricity outages, and ongoing negative cash-flow from current operations on the utilities' side. Total primary energy consumption is 0.2 tons of oil equivalent per capita, one of the lowest in the world,³ and the commercial energy consumption is even lower at only 0.06 tons of oil equivalent per capita. It is estimated that biomass (wood and charcoal) currently makes up 70 percent of energy use in Comoros. The remainder comes almost entirely from imported diesel oil, most of which is used to generate electricity.

Power supply infrastructure: Electricity generation in Comoros is made up of small-scale diesel generators adding up to a total installed capacity of 22 MW, 15 MW of which in Grande Comore, 5 MW in Anjouan, and 2 MW in Mohéli. With the overall condition of generation equipment suffering from a longstanding inadequacy of infrastructure maintenance and rehabilitation, available generation remains far below both installed capacity and peak demand with the exception of Anjouan where supply and demand are fairly closely aligned.

Sector electricity prices: The average electricity tariff of around US\$33 cents/kWh is relatively high compared to most Sub-Saharan African (SSA) countries, but reflects the economics of a small system with generation based almost exclusively on expensive imported diesel oil. By comparison, the current average electricity tariff for Haiti is US\$31 cents/kWh. However, with 220 MW installed capacity of which 85 percent thermal and 15 percent hydropower, Haiti's power system is significantly larger and better diversified. Therefore, a more suitable comparison may be the island of Tonga in the South Pacific, which is also dependent on diesel imports and features a mostly diesel powered installed capacity of 23 MW. At par with other islands in the South Pacific, Tonga's average electricity tariff is US\$50 cents/kWh.

Sector economic and financial performance: Despite the high tariff levels, both MAMWE and EDA are in a situation of ongoing negative cash-flow from current operations. The reasons for the operational deficit are twofold: the high variable cost of the sector's small-scale thermal power generation, and MAMWE's dismal commercial performance.

³ Compared to the average of African countries of 0.5 tons of oil equivalent per capita.



Sector variable fuel and operational cost: With an annual consumption of about 30,000 tons of diesel fuel, the power sector is the most important industrial user of petroleum products in the Comoros, with MAMWE's fuel cost being consistently above international levels. This places an unsustainable burden on the company's gross margins. Moreover, due to the utility's unfavorable generation infrastructure (exclusively consisting of small, fast-spinning, and high-maintenance backup/peaking diesel gensets with no appropriately sized, slower-spinning and less maintenance-intensive units to cover the baseload), the islands' cost of electricity service was the second highest according to a recent comparative study on the performance of power utilities in SSA.⁴

Sector commercial performance: The key issue is the denominator, i.e., the inadequacy of revenues billed and collected. In 2014, an estimated 45 percent of MAMWE electricity production was never billed, and 42 percent of electricity sales billed was never collected. Accordingly, the Bank has helped MAMWE address this crucial issue through the ongoing ESRP. The project, which mainly focusses on improving MAMWE's billing and collection procedures, has shown encouraging results as the company's current total energy losses have recovered to about 30 percent in late 2016. Through the Bank's continued support and the introduction of modern commercial management systems and tamper-proof prepaid meters, the further reduction of MAMWE's collection rates appears feasible in the short- to medium-term. However, as recent developments have shown, any further improvements will strongly depend on continuity in MAMWE's management team and parallel advances with regard to service quality and cost of service. In particular the latter factor is decisive as better collection performance will be nearly impossible with the majority of Comorian customers frustrated by MAMWE's bleak electricity service quality.

Sector fiscal burden: As a consequence of decades of erratic management, the Comorian power sector represents a very substantial burden on public finances. It is expected that in 2017, budgetary transfers to support MAMWE will be above US\$6.5 million, representing about 8 percent of the GoC's tax revenues. Moreover, with additional thermal generation assets scheduled to come online in 2017, and both fuel prices and volatility likely to rise, the burden on the government's finances is expected to escalate further.

Sector operational performance: Throughout 2016, continued delays in the implementation of urgently needed sector rehabilitation investments started undermining the ERSP's initial successes with regard to the utility's financial recovery. With the majority of MAMWE's generation assets having reached the end of their lifetimes, specific fuel consumption has risen further and technical breakdowns have become rampant. While the rise in per-kWh fuel consumption is further reducing the sector's already unsustainable margins, the deterioration of service quality is also affecting collection rates as a growing share of disgruntled customers is becoming reluctant to pay their electricity bills in a context of increasingly long and frequent power cuts.

Access rates and service quality: Population density has helped the GoC's past electrification efforts. As a result, today's access rates in Grande Comore, at around 65 percent, and Anjouan, at around 50 percent, are relatively high for SSA standards. In contrast, the more thinly populated Mohéli is lagging behind, with only around 20 percent of the population connected to the grid. Similarly, service quality for the 60,000 grid-connected households and commercial customers varies significantly between urban areas and the margins of the network. While in 2016, power supply in the capital ranged from 12-20 hours per day, the rest of the island only received about 6 hours of daily electricity services with many localities at the periphery of the grid only being provided with a few hours of power supply per week, if at all. Unsurprisingly, this situation imposes severe constraints on socio-economic progress and poverty eradication.

Potential and Status quo of renewable energy technologies: Recent and reliable data on solar irradiance potential in

⁴ Kojima/Trimble (2016).



Comoros is scarce. However, according to ESMAP's Global Solar Atlas, the Comorian Islands, with an estimated average solar PV output of 1,500 kWh/kWp per year, have a good level of solar radiation capable of supplying solar photovoltaic and thermal installations.⁵

With less than 150 kW of (micro-) hydropower installations in Anjouan and Mohéli, negligible solar energy use, and very early stage efforts for the long-term development of geothermal energy, the scale-up of RE is still in its infancy in the Comoros. However, a number of development partners are active in the energy sector, with an increasing interest in RE, such as the EU, the African Development Bank (AfDB) and the Arab Fund for Economic and Social Development (FADES, Fonds Arabe pour le Développement Economique et Social).

In addition to grid-connected RE resources, the dissemination of solar PV off-grid technology has also commenced, albeit hesitantly and mainly through the (tax-exempt) import and sales of inexpensive Chinese-made solar lanterns and solar home systems (SHS) on Grande Comore. However, to date, with only a few importers and entrepreneurs struggling to overcome substantial market barriers, including the lack of financial service providers to overcome affordability constraints, limited technology awareness and quality control, and the lack of qualified professionals for installation and service of PV technology, the immediate prospects for growth are limited. Therefore, while the market for solar lanterns has shown some encouraging momentum, the penetration of SHS in the business as usual scenario is likely to remain narrowly confined to better-off urban household customers who buy SHS as a back-up to the unreliable grid.

Relationship to CPF

The proposed project is fully aligned with the World Bank Group's Comoros Country Partnership Strategy (CPS) for FY14-17 (Report No. 82054-KM) that was approved by the World Bank Executive Directors in April 2014. The Bank-supported program is structured around two pillars: (1) increased public sector capacity, and (2) shared growth and increased employment, and contributes directly to the objectives of reducing extreme poverty and increasing shared prosperity in Comoros. The CPS's strategic priorities build on a series of interim strategy notes since 2000 and are aligned with the GoC's Strategy for Growth and Poverty Reduction for the period 2015-2019 (SCA2D). The SCA2D provides a framework for medium-term development to lay the foundations "to make the Comoros an emerging country by 2040, respectful of human rights, promoting gender equality and the rule of law."

The proposed Project will contribute to the Pillar 1 of the CPS by restoring power supply, increasing reliability, and reducing power shortages. It will further contribute to improving the efficiency of the utilities and increasing public sector governance and accountability of the utilities. The proposed Project will also support Pillar 2 and its focus on strengthening the foundation for diversified and sustainable economic growth by supporting the development of greater economic opportunities on all three islands, improving access to electricity services by the poor, and supporting the development of solar energy.

C. Proposed Development Objective(s)

Note to Task Teams: The PDO has been pre-populated from the datasheet for the first time for your convenience. Please keep it up to date whenever it is changed in the datasheet.

⁵ PV output and irradiation maps can be seen in Annex 1 and the radiation rate captured on a horizontal plane (Hh) and on an optimally inclined plane (Hopt) at Moroni on Grande Comore and for the islands of Anjouan and Mohéli.



The **Project Development Objective** is to add solar PV and energy storage facilities to the Comorian power generation mix.

The above objective will be achieved through the establishment of a robust technological and institutional platform for the expansion of solar PV energy and the deployment of a first “pilot batch” of off- and on-grid solar PV and storage technology on all three Islands. Thus, the project will support a first, major step toward improving the quality of energy services and easing budgetary pressure on the GoC’s finances through the progressive diversification of the country’s diesel-powered generation infrastructure.

Harnessing the country’s solar energy potential will improve energy security by reducing Comoros’ dependency on imported oil, alleviate poverty by providing households with cheaper sources of power, and foster jobs and economic opportunity through the improved provision of energy services.

Key Results (From PCN)

PDO level indicators will incorporate the new Corporate Results Indicators,⁶ and thus, as applicable, may include:

Generation capacity of energy constructed (MW) – measured as new generation capacity of RE facilities constructed through operations supported by this project;

Projected fuel savings (MJ) – measured as projected lifetime energy savings from substitution of thermal generation capacity;

People provided with improved electricity service (number) – measured as the number of people that benefit from improved electricity services (number of hours/day) through operations supported by this project.

Intermediate indicators will be defined during project preparation, including a citizen engagement/beneficiary feedback indicator.

D. Concept Description

The proposed project will finance the following three components:

- (i) **Grid-connected Solar PV, Storage Facilities, and Power System Upgrades (US\$29 million).** The component will deliver the first MW-scale Solar PV Park in the Comoros with up to 10 MW of solar PV and 7 MWh of Li-Ion battery storage capacity. The construction of PV generation and storage capacity will be realized in 2-3 batches. In parallel, significant additional investments and system upgrades (including system controls, automation, and engineering/feasibility studies) will be implemented. Component 1 will be procured and competitively tendered as a single investment package that will include two years of O&M and a subsequent, well-defined 12-month handover period. Tailored capacity building activities for MAMWE technical staff will also be funded under this component.
- (ii) **Promotion of Off-Grid Solar PV and Public Lighting (US\$5 million) on all three islands.** Based on a detailed market

⁶ These are all relevant Bank CRI with respective underlying intermediate indicators. At QER stage, it will be decided which indicators will be used.



assessment, the first sub-component will focus on the competitive procurement of an initial batch of 20,000 SHS⁷ of different system sizes. A streamlined mobile-enabled commercialization platform for SHS will be developed that will be based on MAMWE's new Bank-funded customer management system (CMS). This will allow tapping into MAMWE's existing customer base and commercial infrastructure by offering a scheme to pay upfront cost of SHS in small increments through the electricity bill. Local service companies and distributors will be key to successfully install, and maintain the initial batch of SHS. Quality assurance, certification aspects and capacity building will be supported by Lighting Africa. The second sub-component envisages the installation of around 500 solar LED street lights in agglomeration across all three islands. The activity will cover the installation and a three year O&M contract with local private sector operators.

- (iii) **Project Management, including the Establishment and Operation of a National Project Management and Coordination Unit (US\$2 million).** The component will finance the recruitment of a team of international project and tender management experts to lead the planning, programming, procurement, and implementation oversight of all major energy sector investments in the country's generation, transmission, and distribution infrastructure. Project management services would be provided through the **establishment of a NPMU** staffed with five to six senior international experts covering the entire spectrum of project and tender management, including legal, technical, and environmental/social expertise to procurement and financial management. The senior international experts would work in tandem with a team of eight to 10 local engineers and staff appointed by the GoC's Energy and Water Directorate (DGEME) and MAMWE, who will take over management responsibility after an 18-24 month training period.

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SAFEGUARDS

A. Project location and salient physical characteristics relevant to the safeguard analysis (if known)

High-potential solar sites across all three islands have been identified. A pre-feasibility study was conducted for solar plus storage of 10 MWp on Grand Comores, 4 MWp on Anjouan, and 1 MWp on Mohéli across a number of potential sites. On each island, it was selected potential sites for PV sites and storage. For Grande Comores, four sites have been identified: Domoni, Ntsaoueni, south of Ntsaoueni, Hassendje. These sites are identified as state lands or community lands and are uninhabited. Most of the land is covered with savanna vegetation, but for some location there are some economic activities (quarry, cropland). For Mohéli, the identified site (for storage) is located within the SONELEC land. No primary vegetation cover is observed. For the photo-voltaic center 03 sites were identified including the site of Fomboni, Ouallah (free with crop parcels), Ndrondroni. These three potential sites are uninhabited. For Anjouan, four potential sites are identified: Vigor 1 (without vegetation and uninhabited), Vigor 2 (free land) close to the Domoni football field; and one site close to Bambao Mtrouni hospital. None of these potential sites are covered by primary plant but mainly savanna with some trees or agriculture parcels. With the activities described above, the project will have created a plug-and-play enabling environment for solar investments by other funders.

B. Borrower's Institutional Capacity for Safeguard Policies

⁷ SHS, solar kits and solar lanterns.



The Borrower has generally weak capacity on the management and understanding of the environmental and social safeguard aspects of projects. The responsibility to prepare the necessary safeguard instruments, and managing and mitigating the environmental and social impacts of the project in Comoros will be the responsibility of the existing RCPI 4 (Project Management Unit - PMU). A preliminary capacity assessment indicates that RCPI 4 has limited capacity for implementation of Bank safeguards policies. Therefore, the PMU will comprise an internationally recruited social/environmental expert and a consultant firm will be hired to prepared the required E&S studies. World Bank staff would help the Borrower with detailed guidance on the preparation of required environmental and social safeguard instruments and would conduct close supervision.

C. Environmental and Social Safeguards Specialists on the Team

Paul-Jean Feno, Environmental Specialist
Andrianjaka Rado Razafimandimby, Social Specialist
Mario Rizzolio, Social Specialist

D. Policies that might apply

Safeguard Policies	Triggered?	Explanation (Optional)
Environmental Assessment OP/BP 4.01	Yes	<p>Solar PV power generation does not produce any pollutant. The panels of some solar PV sub-technologies, however, contain chemicals such as cadmium which might require particular attention in their replacement, and during de-commissioning in case of damage.</p> <p>The project will provide investment climate to promote investors to install PV parks. The project will be build SONELEC’s “Solar Energy Backbone” by adding the grid, storage, and dispatch infrastructure and developing the institutional and operational capacity necessary to integrate intermittent Solar Energy to the grid.</p> <p>The identification mission and available technical studies have selected the potential sites could be used for the PV solar parks, transmission lines and storage sites in the three Islands. The main concern is expected to be on workers safety issues during construction; impacts on birds, including impacts such as deterioration of air quality and noise, health & safety of workers and communities, land acquisition and resettlement and economic displacement; environmental and public health risks might arise from improper disposal of SHS batteries could generate of pollution at the water and ground. VBG risk is evaluate as low however the project needs to develop prevention measures. These potential environmental and social impacts from physical works are expected</p>



to be site-specific, temporary and manageable to an accepted level and can be readily avoided/mitigated through implementation of the project environmental management plan. Therefore, the proposed project is Category B as per OP4.01.

The proposed project will prepare detailed environmental and social studies (ESIA/ESMP) : 5 ESIA's with their respective ESMP for identified potential PV solar Parks for the developers and storage sites with the transmission lines for each Island. These ESIA's will be reviewed and cleared by the Bank and then ultimately disclosed both in-country and on the Bank's external website prior to appraisal.

Performance Standards for Private Sector Activities OP/BP 4.03	No	Not applicable
Natural Habitats OP/BP 4.04	TBD	There is no natural habitat site located in the potential sub-project PV solar parks, transmission lines and storage sites. Sensitive natural habitat areas will be avoided. The ESIA will conduct an assessment.
Forests OP/BP 4.36	No	There is no forest coverage in the potential project site locations. The current land occupation picture shows human settlements and degraded land in the surrounding areas.No investments in forests will be supported under the Project.
Pest Management OP 4.09	No	The project will not purchase or use pesticides.
Physical Cultural Resources OP/BP 4.11	Yes	No physical cultural resources are located in the potential sub-project PV solar park areas. As there may be chance finds during construction. The ESIA will include chance finds procedures in case physical cultural resources will be encountered during construction.
Indigenous Peoples OP/BP 4.10	No	There are no ethnic minorities in Comoros that meet the criteria defined under the policy. The policy is thus not triggered.
Involuntary Resettlement OP/BP 4.12	Yes	OP 4.12 is triggered because of the potential social impacts resulting from project activities to support developers to construct PV solar park and to finance the provision of SHS and solar street lighting in the main Island (Ngazija) in Comoros. There will be a limited land acquisition and resettlement that might be necessary to accommodate the estimated 10 ha of solar PV installations. The project activities will require land acquisition and economic displacement. Economic displacement is also expected, but physical resettlement is not likely to occur, as investment zones are selected on none uninhabited areas. The



Borrower will prepare four (04) resettlement action plans (RAPs): Three RAPs for the potential PV sites for the future investor and one RAP for the storage. The ESIA's will include a social assessments and, to be carried out in the RAPs, will include the issues related to workers' safety, and VBG. No Process framework is necessary to this project as access restriction to natural resources is not expected to happen under the project. RAPs will be reviewed and cleared by the Bank and then ultimately disclosed both in-country and on the Bank's external website prior to appraisal.

Safety of Dams OP/BP 4.37	No	The Project is not financing any activities related to dams. This policy is not triggered.
Projects on International Waterways OP/BP 7.50	No	This policy is not triggered as Comoros is an Island country that does not share international waters with neighboring countries
Projects in Disputed Areas OP/BP 7.60	No	This policy is not expected to be triggered by any of the project activities.

E. Safeguard Preparation Plan

Tentative target date for preparing the Appraisal Stage PID/ISDS

Feb 27, 2020

Time frame for launching and completing the safeguard-related studies that may be needed. The specific studies and their timing should be specified in the Appraisal Stage PID/ISDS

As the locations are well known during the preparation, the Borrower with support of consultant firm will prepare the 5 ESIA's ESMPs and 4 RAPs for PV solar parks, transmission lines and storage sites, for all activities in the three Islands All these Environmental and social documents will be reviewed and approved by the Bank and disclosed both in country and in World Bank external website prior appraisal stage.

CONTACT POINT

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APPROVAL

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