



Mozambique: Commercial and Industrial (C&I) Solar Applications

Developer Guide

In collaboration with



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A NOTE TO THE READER

This Developer Guide is meant to be a 'reference document' to inform early market exploration. The Guide is supplemented with Model Business Cases accessible at www.get-invest.eu.

ABOUT GET.INVEST MARKET INSIGHTS

The first series of GET.invest Market Insights was published in early 2019 covering four renewable energy market segments in three countries, namely: renewable energy applications in the agricultural value-chain (Senegal), captive power (behind the meter) generation (Uganda), mini-grids (Zambia) and stand-alone solar systems (Zambia).

This **Developer Guide** aims to inform project developers, private sector technology suppliers, innovators and entrepreneurs about opportunities in the commercial and industrial (C&I) solar sector in Mozambique. The Guide is organised into four main sections: **1)** introduction; **2)** overview of the C&I solar sector, including the benefits of C&I solar, key indicators to assess C&I solar potential, C&I solar market characteristics in sub-Saharan Africa, and a review of the different business models and financing arrangements applicable to the sector; **3)** description of C&I solar applications in the context of Mozambique, including a review of four C&I sectors (agricultural processing, fisheries, tourism and mining), and profiles of C&I solar suppliers that are active in the country; and **4)** exploration of the “Route-to-Market” – i.e., how to leverage the market research presented in this Guide to engage in the C&I solar sector in Mozambique.

Accompanying this Guide are two corresponding **Model Business Cases**, which provide financial analyses for concrete business examples. The two Model Business Cases included in this package analyse: **1)** an on-grid C&I solar lease-to-own project; and **2)** a 32 kWp off-grid C&I solar project.

The GET.invest Market Insights summarise a considerable amount of data that may inform early market exploration and pre-feasibility studies. It is therefore recommended to cross-read this Developer Guide and the Model Business Cases for a comprehensive overview. The products are accessible at www.get-invest.eu.

ABOUT GET.INVEST MOZAMBIQUE

GET.invest is a European programme that mobilises investment in renewable energy, supported by the European Union, Germany, Sweden, the Netherlands and Austria.

Since 2019, to focus specifically on the Mozambican energy sector, the programme has been operating a country window in Mozambique funded by the European Union and Germany as part of PROMOVE ENERGIA – a comprehensive strategy between the EU and the Government of Mozambique to provide households and businesses in rural areas with access to sustainable and affordable energy. Find out more at www.get-invest.eu/get-invest-mozambique/.

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ABBREVIATIONS

AFD	French Development Agency (Agence Française de Développement)	ESCO	Energy Service Company
AfDB	African Development Bank	EUR	Euro
AFSIA	Africa Solar Industry Association	FDI	Foreign Direct Investment
AIMO	Industrial Association of Mozambique (Associação Industrial de Moçambique)	FI	Financial institution
AMER	Mozambican Association of Renewable Energies (Associação Moçambicana de Energias Renováveis)	FNB	First National Bank
APIEX	Agency for the Promotion of Investment and Exports (Agência para a Promoção de Investimentos e Exportação)	FUNAE	Mozambique Energy Fund (Fundo de Energia)
ARENE	Energy Regulatory Authority (Autoridade Reguladora de Energia)	G4A	Green-for-Access First Loss Facility
BAÚ	“One-Stop-Shop” (Balcão de Atendimento Único)	INE	National Institute of Statistics (Instituto Nacional de Estatística)
BCI	Commercial Investment Bank (Banco Comercial e de Investimentos, S.A.)	INIP	National Institute of Fish Inspection (Instituto Nacional de Inspeção de Pescado)
BiG	Global Investment Bank (Banco de Investimento Global)	IPP	Independent power producer
BIM	International Bank of Mozambique (Banco Internacional de Moçambique)	IRR	Internal rate of return
BNI	National Investment Bank (Banco Nacional de Investimentos)	LNG	Liquefied natural gas
BOI	Bank of Industry	LTO	Lease-to-own
C&I	Commercial and Industrial	MIREME	Ministry of Mineral Resources and Energy (Ministério dos Recursos Minerais e Energia)
CAPEX	Capital expenditure	MSME	Micro, small and medium-sized enterprise
CCM	Mozambican Commercial Code (Código Comercial Moçambicano)	MTA	Ministry of Land and Environment (Ministério da Terra e Ambiente)
CPI	Investment Promotion Centre (Centro de Promoção de Investimentos)	MW	Megawatt
DFI	Development Finance Institution	MWp	Megawatts peak
EDM	Electricity of Mozambique (Electricidade de Moçambique)	MZN	Mozambican metical
		NDEE	National Directorate for Electrical Energy
		NES	National Electrification Strategy
		NGN	Nigerian naira
		O&M	Operations and Maintenance
		PPA	Power Purchase Agreement
		PPP	Public-Private Partnership
		PUE	Productive use of electricity

REA	Rural Electrification Agency
SADC	Southern African Development Community
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruptions Frequency Index
SHS	Solar home system
SME	Small and medium-sized enterprise
SUNREF	Sustainable use of natural resources and energy finance
TA	Technical assistance
UNIDO	United Nations Industrial Development Organisation
USADF	US African Development Foundation
USD	United States dollar
VAT	Value-added tax
Wp	Watts peak

EXECUTIVE SUMMARY

According to the Africa Solar Industry Association, Africa added a total of 949 MW of new installed solar PV capacity in 2022.¹ Capacity additions from commercial and industrial (C&I) solar accounted for about one-quarter of this total at 246 MW – a sharp increase of 62% compared to 2021. Solar is increasingly being deployed at C&I sites across sub-Saharan Africa, with some countries experiencing more growth in the sector than others depending on local energy market conditions and the presence or lack of a supportive enabling environment. In 2022, Nigeria had the largest concentration of C&I solar installations in the region outside of South Africa, followed by Kenya and Ghana.²

The international investment community has developed a growing appetite for C&I solar projects in Africa, as they are considered attractive investment opportunities. C&I solar projects are based on B2B negotiations, which can be more efficient and offer more appealing internal rates of return (IRR) compared to larger-scale, government-run tendering programmes due to international competition.

In most on-grid areas, the sector is driven by cost savings, as solar power generated on-site is, in most cases, cheaper than the electricity tariffs paid by C&I users. However, national grid networks in sub-Saharan Africa are often limited to capital cities and larger urban centres, leaving many rural enterprises to rely on off-grid standalone solutions for electricity. Relying on diesel generators is expensive for small businesses operating in off-grid areas, which can be offset by switching to solar power. Hence, the main incentive for both on- and off-grid C&I solar across sub-Saharan Africa is the reduction of electricity costs.

Although the C&I solar sector in Mozambique is still in its nascent stages, several EPC providers to large-scale IPP projects offer equipment and services for installations, facilitating lower barriers to market entry. The average electricity tariff for medium

voltage C&I customers in Mozambique (which is used as a benchmark to assess the viability of C&I solar projects) is low by global standards, at approximately EUR 0.07/kWh. However, average electricity tariffs in the country are expected to increase in the near and medium term, as the government and national utility, Electricidade de Moçambique (EDM), attempt to move closer to cost-reflective tariffs. With the reliability of the grid typically varying from one network to the next, the main grid in the northern provinces of the country generally experiences more frequent interruptions than the grid around Maputo and in the rest of the country – thus making C&I solutions potentially more relevant in the north.

Many business sectors in Mozambique can benefit from C&I solar solutions. This Developer Guide explores four sectors in depth: **i)** agricultural processing; **ii)** fisheries; **iii)** tourism; and **iv)** mining. Based on the number of existing businesses and their average electricity consumption, the estimated C&I solar market potential for all four sectors combined is estimated to be 173 MWp, with a market value of EUR 282M, of which 45 MWp is off-grid and 128 MWp is on-grid. These are conservative estimates given that some value chains are not included.

To catalyse growth in the C&I solar market, developers can benefit from import tax exemptions enabled by the Mozambican investment promotion agency, Agência Para a Promoção de Investimento e Exportações (APIEX). This exemption allows for significant cost reductions, given that most solar equipment is not produced locally. The government of Mozambique is taking additional measures to improve the country's enabling environment for the C&I solar sector, such as the new electricity law and a 'one-stop-shop' mechanism to expedite the approval process for registering a new company in Mozambique, as described in **Section 4** of this Guide ('Route-to-Market').

1) Hutchins, M., "Africa closing in on gigawatt-level solar," PV Magazine, (January 19, 2023): <https://www.pv-magazine.com/2023/01/19/africa-closing-in-on-gigawatt-level-solar/>
2) Africa Solar Outlook 2023, Africa Solar Industry Association (AFSIA), (2023): <http://afsiasolar.com/data-center/outlook-report/>

An assessment of local banks in Mozambique found that the country can benefit from specific credit lines tailored to the C&I solar sector. Financing is currently subject to commercial debt-based financing indexed at the prime interest rate and offered according to the specific conditions dictated by various commercial banks operating in the country. Local bank interest rates are considered high for those seeking loans for renewable energy equipment, which is an opportunity to offer innovative financing modalities such as C&I leasing and PPAs (as presented in the Model Business Cases accompanying this Guide). Additionally, GET.invest supports capacity development of the financial sector to improve access to local currency financing for clean energy companies and project developers and to design financial products for small-scale C&I projects.³

Increasing the uptake of C&I solar in Mozambique will require a stronger enabling environment through collaborative efforts between the government, development partners, financiers and the private sector. As presented in the accompanying Model Business Cases, the cost of capital, high local interest rates and low utility tariffs are the main obstacles to increased uptake of C&I solar in the country. However, with the observed trends of innovative financing, capacity development of domestic financial institutions as well as an expected increase in electricity tariffs in the coming years, the sector's outlook is promising.

This Developer Guide has captured input from a wide range of market actors, partners and stakeholders, and therefore serves as a manual for the private sector. It also serves as a conversation starter to support collaborative work across Mozambique's C&I solar sector.

3) "GET.invest expands capacity development for domestic financiers," <https://www.get-invest.eu/get-invest-expands-capacity-development-for-domestic-financiers/>

SECTION 1

Introduction



This Developer Guide is a reference document for project developers to inform early market exploration into the commercial and industrial (C&I) solar sector in Mozambique.⁴ The Guide describes which sectors of the Mozambican economy can benefit from solar power, how these sectors are organised, who the key market actors are, what business models are being deployed, who are the potential financiers, what financial returns might be expected from providing solar energy to C&I clients, how a C&I solar provider would develop a service offering in Mozambique, whether specific legal frameworks facilitate (or hinder) C&I solar project development and other opportunities and challenges that exist for the development of C&I solar projects in the country.

The Developer Guide is organised into three main sections (following this introduction):

- 1) Principles of Commercial and Industrial Solar Technology:**
This section provides context for C&I solar development in sub-Saharan Africa, including an overview of the sector's benefits, financing mechanisms and business models and key indicators for assessing C&I solar potential.
- 2) Commercial and Industrial Applications in Mozambique:**
This section looks specifically at the market for C&I solar in Mozambique.
- 3) Route-to-Market:** This section explores how to leverage the market research presented in this Guide to set up a C&I solar project in Mozambique.

This Guide is part of a package of products under the GET.invest Market Insights. Each package is country specific and covers a certain renewable energy market segment. In addition to this Developer Guide, the Market Insights package also includes corresponding Model Business Cases.

There are two Model Business Case documents that accompany this Guide:

- 1) On-grid C&I Solar Project:** The first Model Business Case examines a solar system sold to a grid-connected industrial client on a lease-to-own basis.
- 2) 32 kWp Off-grid C&I Solar Project:** The second Model Business Case analyses a Mozambican solar company providing a rooftop solar system to an off-grid commercial hotel on an "at-risk" basis – pre-financing the system's capital investment in exchange for a share in the financial savings generated by the hotel's switch from a diesel generator to solar energy.

4) "Project developers" refers to developers and/or investors interested in investing and/or developing projects in Mozambique's commercial and industrial (C&I) solar sector. This report provides developers with preliminary market information and other regulatory guidelines to better understand the enabling environment for C&I projects in Mozambique.

SECTION 2

Principles of Commercial and Industrial Solar Technology



This section provides context for commercial and industrial (C&I) solar development in sub-Saharan Africa, including an overview of the sector's benefits, financing mechanisms and business models and key indicators for assessing C&I solar potential.

2.1 BENEFITS OF C&I SOLAR

The main incentive for C&I solar projects is the reduction of electricity costs resulting from a transition to solar technology. Commercial and industrial solar applications are particularly beneficial to businesses operating in off-grid areas that can achieve savings by switching from expensive diesel generators to solar power. For grid-connected businesses, investing in C&I solar can lead to savings in the form of a reduced power utility bill. In addition to the financial benefits, there are several key drivers for companies to invest in solar energy, including:

- Protection against price volatility by allowing companies to operate according to fixed and predictable electricity costs;
- Improved electricity quality, in particular, when combined with storage (batteries) and/or a back-up power source such as a generator. This is especially relevant in countries where grid electricity is unreliable and/or of poor quality (frequent or prolonged outages, voltage variations, etc.); and
- Reduction of CO₂ emissions (i.e., from operating a diesel generator).

2.2 ENABLING ENVIRONMENT FOR C&I SOLAR

In many countries across sub-Saharan Africa, C&I solar policy and regulatory support is insufficient, as the sector is often not the focus of national energy policies or electrification strategies. A supportive enabling environment is critical for the viability of C&I solar projects, including favourable electricity price and tariff structures and the existence of net metering or similar regulations allowing distributed renewable energy access to the grid, among others.

Several indicators can be used to assess the overall enabling environment for C&I solar projects. In [Table 1](#), these indicators are split into three categories – basic indicators, regulatory indicators and other indicators. The indicators are generally presented in order of importance; however, the order may change based on specific country context.

In addition to the indicators described in [Table 1](#), there are other factors independent of the country context that can also influence the attractiveness of C&I solar. For example, reductions in solar system costs—especially over the last decade—and the evolution of private sector business models (e.g., third-party ownership schemes) have combined to drive rapid solar market growth, particularly in sub-Saharan Africa. Shifts in global commodity prices and exogenous shocks such as the COVID-19 pandemic can also impact C&I solar costs and market development.

2.3 C&I SOLAR MARKET CHARACTERISTICS IN SUB-SAHARAN AFRICA

According to the Africa Solar Industry Association (AFSIA), Africa added a total of 949 MW of new installed solar PV capacity in 2022, which represented a 14% increase compared to 2021.⁵ Capacity additions from C&I solar accounted for about one-quarter of this total at 246 MW – a sharp increase of 62% compared to 2021.⁶ Solar is increasingly being deployed at C&I sites across sub-Saharan Africa, with some countries experiencing more growth in the sector than others depending on local energy market conditions and the presence or lack of a supportive enabling environment. In 2022, Nigeria had the largest concentration of C&I solar installations in the region outside of South Africa, followed by Kenya and Ghana ([Figure 1](#)). A summary of C&I solar market characteristics in South Africa, Nigeria and Kenya – the countries with the most installed C&I solar capacity in sub-Saharan Africa to-date – is provided in [Table 2](#).

In Nigeria, the market for C&I solar projects is driven by the country's widespread use of expensive diesel generation to compensate for unreliable grid power and a significant electricity supply deficit. In other countries, the sector is mainly driven by cost savings, as solar power generated on-site is, in most cases, cheaper than the electricity tariffs paid by commercial and industrial users.

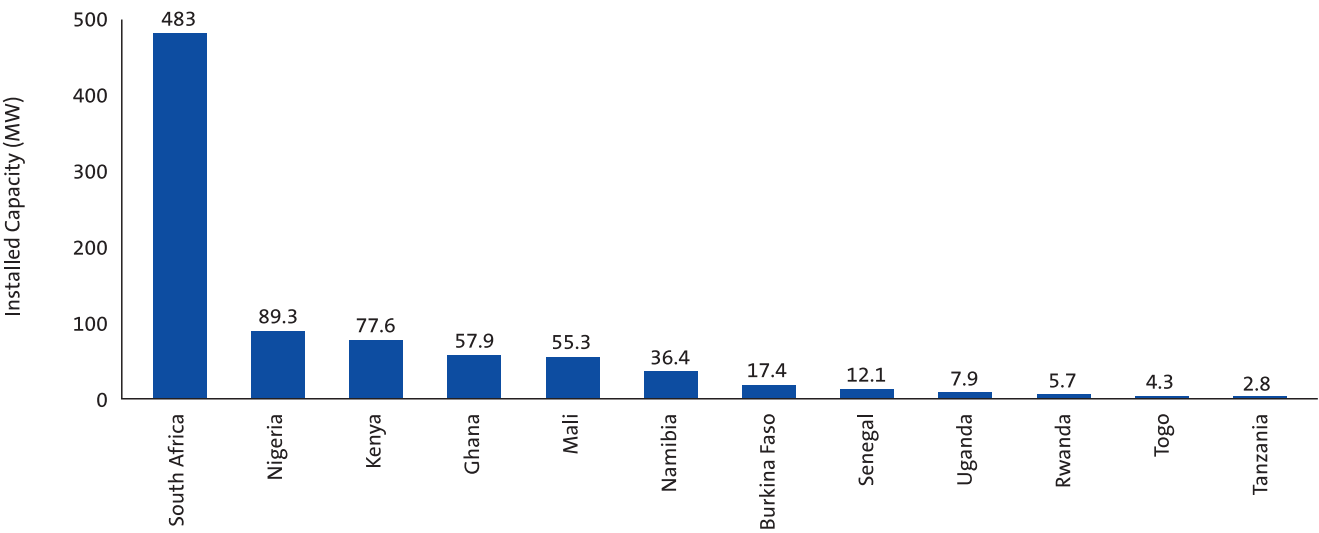
5) Hutchins, M., "Africa closing in on gigawatt-level solar," PV Magazine, (January 19, 2023); <https://www.pv-magazine.com/2023/01/19/africa-closing-in-on-gigawatt-level-solar/>

6) Africa Solar Outlook 2023, Africa Solar Industry Association (AFSIA), (2023); <http://afsiasolar.com/data-center/outlook-report/>

TABLE 1. Key indicators to assess the potential for C&I solar projects

INDICATOR	DESCRIPTION
Basic	<p>Basic indicators are linked to the general context of the country's electricity market and include the following:</p> <ul style="list-style-type: none"> — Cost of grid electricity (tariff): The higher the cost of electricity, the more attractive solar energy will be for the C&I sector. — Quality of grid electricity (load shedding/outages): Poor quality of electricity from the national grid forces C&I enterprises to depend on expensive back-up power sources, such as diesel generators. — Availability of grid electricity (access): The absence of the national grid in rural areas forces rural C&I enterprises to find alternative sources of electricity.
Regulatory	<p>Regulatory indicators are defined as policies, regulations or other incentives established by governments to promote, accelerate and/or regulate C&I solar market development and include the following:</p> <ul style="list-style-type: none"> — Net-billing: Policy mechanism designed to promote renewable energy generation by allowing the C&I solar beneficiary/developer to sell a regulated amount of energy produced by its solar system to the national power utility at a regulated price. If available, this policy allows for a faster investment recovery and in some cases can even generate profit for the developer. This is generally available in on-grid areas for a limited period. — Net metering: Similar to net-billing in that it also allows for faster recovery of the investment. However, unlike net-billing, there is no monetary transaction. This regulation allows the beneficiary to store surplus energy produced by the solar system in the power utility to be used at a later period (the extra energy from solar systems that is not used during the day is sent to the utility to be used at night; it is a simple exchange of energy). — Tax incentives: Exemptions or reductions in duties and/or value-added tax (VAT) on solar equipment, which reduces the cost of solar energy compared to other conventional sources of energy.
Other	<ul style="list-style-type: none"> — Access to finance: Limited access to financing is a key barrier to the uptake of renewable energy solutions. Financing schemes, such as dedicated credit lines, can facilitate renewable energy project development. This is particularly important for C&I and/or solar companies in order to cover the high up-front investment costs associated with solar solutions. — Risk mitigation measures: Risk mitigation is critical to unlocking access to financing for C&I solar projects. Risk mitigation measures are important to commercial lenders, as they can help address risks (such as currency risks and repayment guarantees) that inhibit the deployment of funding to the sector. — Quality assurance: The existence of a certification/verification agency to certify the quality of products, companies and/or installations is also essential for C&I companies that may not be familiar with solar technology and want to ensure that their long-term investment is reliable/secured.

FIGURE 1. Installed C&I solar capacity in select countries in sub-Saharan Africa, 2022 (MW)⁷



NOTE: Many African countries do not have reliable data collection mechanisms for C&I solar projects. The data presented in **Figure 1** is from a selection of countries in sub-Saharan Africa and therefore represents only a portion of the total installed C&I solar capacity across the region.
Source: Africa Solar Industry Association, 2023.

Throughout sub-Saharan Africa, national grid networks are often limited to capital cities and larger urban centres, leaving many rural enterprises/sectors to rely on stand-alone off-grid solutions

for electricity. This is true, for instance, in the telecommunications sector, which relies on diesel generators and/or solar energy to power off-grid telecommunications infrastructure.

7) Africa Solar Outlook 2023, Africa Solar Industry Association (AFSIA), (2023): <http://afsiasolar.com/data-center/outlook-report/>

TABLE 2. Key characteristics of the C&I solar sector in South Africa, Nigeria and Kenya

COUNTRY	C&I SOLAR MARKET DRIVERS	C&I SOLAR MARKET STATUS
South Africa	<ul style="list-style-type: none"> — Licence for power generation below 1MW not required — Target set by South Africa's Integrated Resource Plan 2019 aims to increase solar PV by over 400% by 2030 	<ul style="list-style-type: none"> — 101 MW of installed capacity — C&I solar projected to represent 30-40% of all solar capacity installed in the country in the near future
Nigeria	<ul style="list-style-type: none"> — Low rates of electricity access, particularly in rural areas — Where grid connections exist, access is unreliable, with frequent power outages — Solar power is a more cost-effective solution compared to diesel generators; C&I solar with battery storage is USD 0.19/kWh compared to USD 0.28-0.32/kWh for a diesel generator — Licence for power generation below 1MW not required — Rural Electrification Agency programmes supporting the industry — Financing available through Bank of Industry 	<ul style="list-style-type: none"> — 20 MW of installed capacity — Estimated market potential of 1,325 MW
Kenya	<ul style="list-style-type: none"> — Low rates of electricity access, particularly in rural areas — Tax exemptions (import duties and VAT) on solar systems and components (batteries, panels, inverters) — Cost of C&I solar USD 0.14/kWh is about 18% lower than industrial grid tariffs and 13% lower than commercial tariffs — Licence for power generation below 1MW not required — Net metering scheme — Relatively high rate of consumer awareness 	<ul style="list-style-type: none"> — 27 MW of installed capacity — Estimated market potential of 650 MW

2.4 FINANCING C&I SOLAR IN SUB-SAHARAN AFRICA

The international investment community has developed a growing appetite for C&I solar projects in Africa. Commercial and industrial projects in the region are considered attractive investment opportunities as they are based on B2B negotiations, which allows for more efficient engagements (faster than lengthy government tendering), and they can offer interesting internal rates of return (IRR) compared to international tenders for large-scale projects, where international competition pushes IRR expectations to their lowest limits.

Regional C&I developers (e.g., Daystar Power, Starsight, DPA, Total, etc.) are taking advantage of economies of scale by developing hundreds of C&I projects across the continent and initiating processes that allow for the efficient implementation of these projects. Finance remains an ongoing challenge for the sector, especially for single projects with lower ticket sizes, as larger portfolios of projects are more attractive for investors. In 2022, Norwegian solar development and investment company, Empower New Energy, signed an agreement to raise USD 74M from a consortium led by Climate Fund Managers to develop 150 MW of C&I solar projects in Africa over the next three years. This financing deal, representing the largest capital raise in the African C&I market to date, is a promising signal for future growth of the C&I solar market segment.⁸

8) Smith, T., "Another financial boost for the Africa C&I solar sector," ESI Africa, (September 30, 2022): <https://www.esi-africa.com/industry-sectors/finance-and-policy/another-financial-boost-for-the-africa-ci-solar-sector/>

The methods currently being used to finance C&I solar projects in sub-Saharan Africa are described below.

Cash transaction

The most common method used in early-stage markets is a cash transaction, whereby C&I companies fund their own solar PV projects from existing cash reserves. Given the relatively high upfront costs of solar systems, only mature and modestly profitable companies can afford to purchase systems this way. If available, additional incentives such as tax benefits, rebates or carbon credits may also be used to offset the purchase of a solar system. Outside of the warranty period provided by the solar company for the installation (typically 1-2 years), the C&I beneficiary is responsible for ongoing annual costs (O&M, insurance, performance monitoring) and is exposed to the performance risk of the system. In Mozambique, this model is most commonly seen in tourism establishments located in off-grid areas.⁹

Local commercial bank or microfinance institution loans

While not commonly found in sub-Saharan Africa, financial innovations such as on-lending facilities and credit guarantees offered by development finance institutions (DFIs) for local banks to provide local currency lending to off-grid energy providers, as well as a gradual reduction in perceived risk, have led local banks in some countries to make commercial financing available. For example, in South Africa, Absa, Nedbank, Standard Bank and First National Bank (FNB) all offer loans¹⁰ for solar PV installations using term loans,¹¹ instalment sales agreements,¹² asset and property finance,¹³ mortgage-backed business loans¹⁴ and access bonds.¹⁵ However, most local commercial banks in sub-Saharan Africa have little to no experience with solar lending and are

unfamiliar with how to evaluate risk in the sector, which limits their financing appetite.

GET.invest offers technical assistance (TA) to local financial institutions (FIs) in several countries throughout sub-Saharan Africa to design financial products and support local currency lending to the renewable energy sector. In Mozambique, GET.invest is providing training and coaching to Banco Comercial e de Investimentos S.A. (BCI), Banco Nacional de Investimento (BNI) and Banco Internacional de Moçambique (BIM) to help each institution develop due diligence processes and specific financial products for renewable energy projects and companies.

In Nigeria, the Bank of Industry (BOI) operates a NGN 6B (EUR 13.5M) clean energy fund with an advertised annual cost of debt of 9%,¹⁶ which is the only source of naira financing for C&I solar that is considered affordable by solar developers in the country.¹⁷ C&I developers have been quoted interest rates well above 20% from local banks with only short-term tenors.¹⁸ Other sources of financing such as the US African Development Foundation (USADF)/All On fund and the World Bank/AfDB Nigeria Electrification Project are usually blended financing (i.e., grants or convertible loans) denominated in foreign currency and require recipients to have raised prior funding.¹⁹ From the Central Bank of Nigeria's study of the prime and maximum lending rates available for the power and energy sector from Nigerian commercial banks, the lowest prime lending rate available is 15% from Access Bank, with most banks offering average prime rates over 20% and an average maximum rate of 27%. Access Bank and the United Bank for Africa (UBA) both have access to a line of credit on favourable terms from Agency

9) Examples include Sussurro near Vilanculos, Banyan Tree Ilha Caldeira and the Zambezi Delta Safari camp.

10) "Five solar PV financing options for C&I businesses in South Africa," ESI Africa, (Aug 12, 2021): <https://www.esi-africa.com/industry-sectors/finance-and-policy/five-solar-pv-financing-options-for-ci-businesses-in-south-africa/>

11) A loan that is given for a fixed duration of time, has a specified repayment schedule and must be repaid in regular instalments.

12) A credit sale contract where the purchase is financed by the merchant, who usually assigns the contract to a financial institution, and the buyer then pays for the item by making a series of payments over a given period.

13) A type of borrowing where the company uses its existing inventory, accounts receivable or short-term investments or commercial/residential property to secure short-term financing.

14) These are backed by mortgages on commercial properties and can provide liquidity to real estate investors and commercial lenders.

15) A type of home loan that allows borrowers who have paid extra money into their bond to withdraw the extra money should they need it.

16) "Solar Energy Fund," Bank of Industry, Nigeria: <https://www.boi.ng/products/solar-energy-fund/>

17) Bloomberg New Energy Finance, responsibility and Global Climate Partnership Fund, 2019.

18) "Exploring the Role of Guarantee Products in Supporting Local Currency Financing of Sustainable Off-Grid Energy Projects in Africa," African Development Bank, (November 2020): <https://africa-energy-portal.org/sites/default/files/2020-11/Local%20Currency%20Financing%20of%20Off-Grid%20Renewable%20Energy%20Projects%20in%20Africa%20Report.pdf>

19) "Financing Off-grid Electrification: A multi-instrument approach," Havenhill Synergy Limited, (February 1, 2021): <https://havenhillsynergy.com/financing-off-grid-electrification-mini-grids-multi-instrument-approach/>

Française de Développement (AFD) and the EU, as part of a US\$74 million intervention through the Sustainable Use of Natural Resources and Energy Finance (SUNREF) Programme. However, these banks have been reluctant to use the funds to provide additional loans to the renewable sector because they must apply an interest rate cap when using the funds which makes it unattractive (from the banks' reported perspective) to provide additional loans to developers.²⁰

With support from development partners, some countries are providing TA to local FIs to build their capacity for lending to the sector, as well as funding through dedicated credit lines and risk mitigation instruments such as guarantees. For example, the SUNREF programme, an initiative funded by the EU and implemented by AFD, provides concessional financing and TA to FIs to fund clean energy projects. The TA component aims to validate clean energy projects and their eligibility for the programme, which are then presented to local partner banks for financing. SUNREF achieved success in East Africa's C&I market segment before its more recent expansion into West Africa. In Kenya, for example, the programme engaged with the Kenya Association of Manufacturers to finance clean energy projects in partnership with Cooperative Bank of Kenya, Diamond Trust Bank and Commercial Bank of Africa.²¹

Elsewhere, in Mozambique, credit lines for renewable energy projects are being provided by several local banks, including Banco Comercial e de Investimentos, S.A. (BCI), which provided the SUPER credit line supported by the United Nations Industrial Development Organisation (UNIDO) and financed by the Global Environment Facility. The EUR 1M credit line is budgeted for productive use of electricity (PUE) renewable energy systems in small-scale industrial and agricultural sectors,²² and is structured as a guarantee fund for risk mitigation, with the expectation of easing the required guarantees.²³

As part of a 2012 agreement between the governments of Mozambique and Germany, KfW provides financial support to the Bank of Mozambique to execute credit lines for the promotion of micro, small and medium-sized enterprises (MSMEs) and renewable energy and energy efficiency products. This BCI Environmental Credit Line, which launched in 2018, starts with an amount of EUR 3M that can be invested in short- and medium-term operations and leasing of movable property operations. These operations are in local currency and can have a term of up to five years, with a limit for individuals of up to MZN 5M (EUR 75k), and a limit for companies of up to MZN 20M (EUR 295k), at a 15% fixed rate.²⁴

Solar company financing on an “at-risk” basis

This business model is found in countries where mature solar companies exist and have access to affordable commercial loans and/or are capable of importing and storing solar equipment. This is an attractive solution for C&I companies that are not fully convinced about the technology and would rather let solar companies assume all or most of the risk.

Under this arrangement, the solar company supplying the solar systems bears most or all the investment risk. For the solar system company to recover its investment, several contractual arrangements exist, with the three most popular being an Energy Service Company (ESCO) arrangement, a Power Purchase Agreement (PPA) and a Leasing Agreement.

- **ESCO:** Under an ESCO arrangement, a C&I company makes regular payments to the ESCO (a solar company that is utilising an ESCO business model) based on the electricity cost savings generated by the solar system or based on a fixed monthly fee. In most cases, once the initial investment from the solar company has been recovered, the assets can be transferred to the C&I company and the monthly payment adjusted to only reflect maintenance.

20) African Development Bank, 2020.

21) “AFD, KAM Provide Green Energy Financing in East Africa,” Kenya Association of Manufacturers, <https://kam.co.ke/afd-kam-provide-green-energy-financing-in-east-africa/>

22) “Stand Alone Solar (SAS) Market Update: Mozambique,” Tetra Tech International Development, UK Foreign, Commonwealth and Development Office (FCDO) Africa Clean Energy Technical Assistance Facility, (March 2021): <https://www.ace-taf.org/wp-content/uploads/2021/04/Stand-Alone-Solar-SAS-Market-Update-Mozambique.pdf>

23) “US \$1 million credit line launched for the financing of Renewable Energy systems for productive uses in rural areas of Mozambique,” Towards Sustainable Energy for All Mozambique (TSE4ALLM), <https://www.tse4allm.org.mz/index.php/en/midia/success-stories/lancada-linha-de-credito-de-1-milhao-de-dolares-para-energias-renovaveis>

24) “BCI Creates an Environmental Credit Line,” Associação Lusófona de Energias Renováveis (ALER), (31 July 2018): <https://www.aler-renovaveis.org/en/communication/news/bci-creates-an-environmental-credit-line/>

- **PPA:** Under a PPA arrangement, a solar company supplies and installs a fully operational solar system at its own expense in exchange for the guaranteed purchase of the electricity generated at an agreed-upon tariff. The C&I company buys the energy supplied by the solar system at a fixed price per kWh over a specific period. C&I companies that use large amounts of daytime power and operate five to seven days per week are likely to generate the highest savings from a PPA. The ownership of the solar system remains with the solar service provider until the end of the agreement. C&I companies generally have the option of purchasing the system during the term of the agreement.²⁵
- **Leasing:** Under a solar leasing arrangement, or solar lease agreement (also known as an equipment rental agreement), the C&I companies pay a fixed monthly lease payment for the duration of the lease term.²⁶ C&I companies pay a smaller initial investment and a fixed monthly payment that is determined based on the estimated annual energy production of the solar system. This method is popular in markets with unreliable grid power where customers are seeking consistent power supply. Fees for equipment rental are usually charged at a fixed monthly price with indexed payments for diesel fuel,²⁷ in cases where the vendor provides a diesel generator backup as well.²⁸ At the end of the contract, the solar company will generally take back the equipment. In the case where the equipment becomes the property of the C&I company after a pre-ordained duration of rental payments, the contract is generally called lease-to-own (LTO). These contracts can last between 5-25 years. For shorter lease lengths, the individual payment amounts are considerably higher than for longer-term agreements due to the accelerated amortisation period.²⁹ In some contracts, system purchase is possible at certain points during the contract at a cost calculated to represent the remaining value of the system.³⁰

Regardless of the type of contract, under this model, access to financing is generally the main limitation. In fact, in most African countries, where commercial banks are risk averse and have relatively limited knowledge of solar technology and business models, it is easier for these FIs to provide loans to C&I companies—depending on the revenue of their businesses—rather than solar companies whose income is dependent on the revenue generated by the solar system.

Another key constraint is the enabling policy and regulatory framework in place, which may limit options in terms of the types of agreements/contracts that a C&I company can select. For example, in countries with non-liberalised power sectors, solar companies are prohibited from selling kilowatt-hours, which prevents C&I companies from signing PPAs.

2.5 PROFILES OF C&I SOLAR SUPPLIERS IN SUB-SAHARAN AFRICA

Most suppliers of C&I solar solutions are solar companies that are already active in other solar market segments (e.g., micro-/mini-grids, stand-alone solar systems for homes and businesses, productive use systems etc.). These companies offer a range of services, such as supply, installation, monitoring and operations and maintenance (O&M) of solar systems for commercial and industrial clients across industries (e.g., hospitality, education, health, agriculture, etc.).

Table 3 presents an overview of the major C&I suppliers in South Africa, Nigeria and Kenya. In South Africa, the C&I solar sector accounts for about 60% of the country's verified solar installations.³¹ In Nigeria, most C&I solar companies offer services across several industries and are typically also involved in the mini-grid and stand-alone solar homes system (SHS) sectors. Most C&I solar operators are internationally-owned companies, although

25) ESI Africa, 2021.

26) Ibid.

27) Indexed payments are adjusted automatically with inflation to maintain a stable relative price over time.

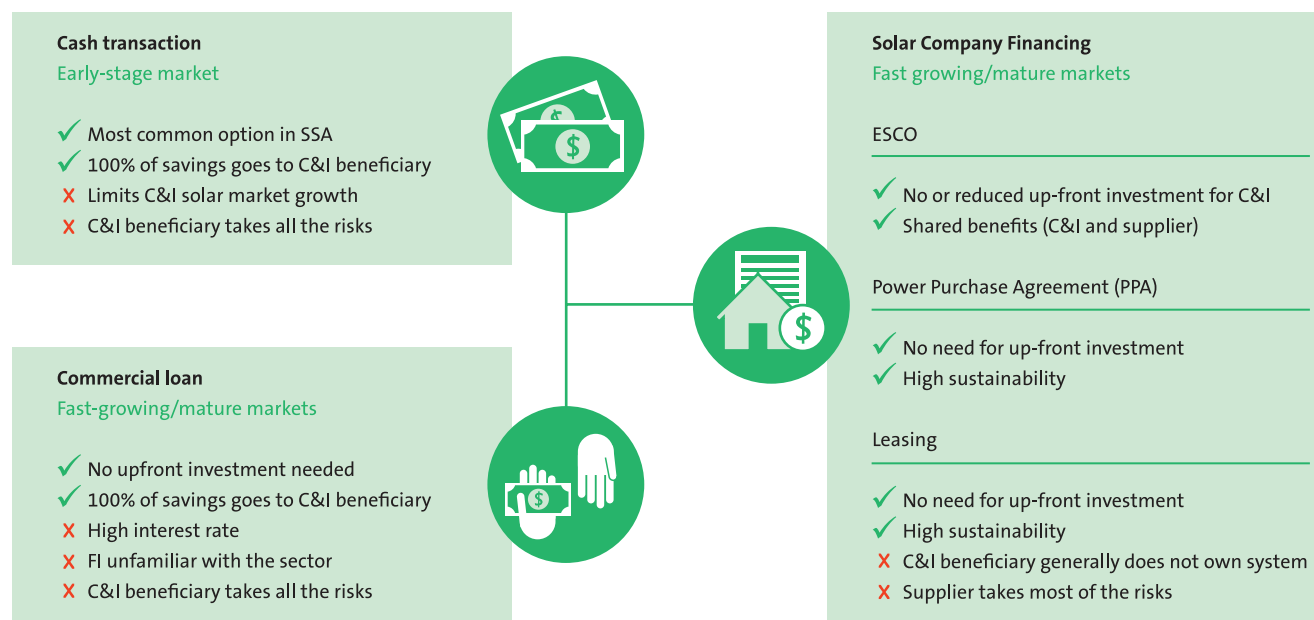
28) Bloomberg New Energy Finance, responsibility and Global Climate Partnership Fund, 2019.

29) Ecoligo: <https://ecoligo.com/en/get-solar/energy-faqs/>

30) "How to Pay for Commercial Solar: A Financing Guide to Contractors," Aurora Solar: <https://aurorasolar.com/blog/how-to-pay-for-commercial-solar-a-financing-guide-for-contractors/>

31) "Energy Services: 2018 Market Intelligence Report," GreenCape, (2018): <https://www.greencape.co.za/assets/Uploads/GreenCape-Energy-Services-2018-MIR-25052019.pdf>

FIGURE 2. Summary of financing methods for C&I solar projects in sub-Saharan Africa



local companies have also received financing for C&I projects, as well as project management assistance from government agencies such as the Rural Electrification Agency (REA).³² In Kenya, most of the private companies operating in the sector are internationally-owned and have projects across the wider East Africa region, providing C&I solar solutions as well as services

in the solar mini-grid, stand-alone and productive use sectors. Many international developers favour Kenya as an initial point of entry into sub-Saharan Africa's C&I market due to the country's mature sector, supportive regulatory environment and skilled local labour force.

32) "The Nigerian Energy Report 2019: Disruptors: How off-grid energy companies are closing Nigeria's energy access gap," Business Day, (2019): https://www.all-on.com/media/publications/_jcr_content/par/textimage_1943192789.stream/1560239896557/8df5c9fbfccfa74ffaf-52c28a4ccd4ef6d90e26b/the-nigerian-energy-report-updated.pdf

TABLE 3. Main C&I suppliers in South Africa, Nigeria and Kenya










COUNTRY	COMPANY	LOCAL / INTERNATIONAL	DESCRIPTION
South Africa		Internationally affiliated	Since establishment in 2010, SUNWORX has become a leading supplier of PV systems in South Africa. Formerly operated under the title of SolarTotal RSA and part of the international SolarLiving group.
		Local	SOLA Build started in 2013 as SOLA Future Energy, an EPC concentrating on private-sector PV opportunities.
		International	Established in 2007, Sustainable Power Solutions (Pty) Ltd (SPS) has evolved into one of a few full-fledged South African EPCs specialising in the turnkey provision of solar PV systems to commercial and industrial clients.
		Local	Established in May 2010 by Jaco Botha and DeVilliers Botha, Solareff (Pty) Ltd has become renowned as one of the leading specialists in solar photovoltaic (PV) solutions in South Africa.
		Local	Rhino Energy Solutions is a South African company founded in 2010. It is one of the most well-established solar energy EPC consultants in South Africa.
		Local	Established in 2003, BrightBlack's initial entry point into the market was by optimising energy efficiency in commercial properties. BrightBlack Energy is a South African company that designs, builds, finances, operates and manages renewable energy solutions for commercial clients.
		Local	Emergent Energy was founded in 2010 and provides renewable energy and energy efficient solutions and consulting services using state-of-the-art technologies and methodologies.
		Local	Energyworx is a software company founded in 2012 that offers a SaaS-based platform for energy data management and intelligence cloud service.
		Local	South Africa's Rubicon Group enables transformative sustainable and industrial technologies across the energy and manufacturing sectors in Africa and other emerging markets.

TABLE 3. Continued











COUNTRY	COMPANY	LOCAL / INTERNATIONAL	DESCRIPTION
Nigeria		International	Starsight Energy provides premier clean on-grid and off-grid energy services to commercial and industrial clients in Africa.
		International	Daystar Power was founded in 2017 to help solve the energy crisis facing businesses with solar power solutions.
		Local	Rensource was established in 2015 as an energy company and a financial services business. Rensource offers a turnkey business opportunity that allows qualifying companies throughout Nigeria and West Africa to start selling Power-as-a-Service (“PaaS”) to their customers.
		Local	ICE deploys micro-grids to help small businesses with limited or no access to reliable and affordable electricity to quickly access clean energy.
		International	Established in 2017, SOLAD is an investor in and operator of distributed energy solutions that deliver clean, reliable, and affordable power to unconnected or underserved customers across the African continent.
		International	RP Global is an Independent Power Producer with more than thirty years of experience in the renewable energy sector. As a developer, investor and operator, RP Global focuses on solar PV, hydro and wind energy projects.

TABLE 3. *Continued*

COUNTRY	COMPANY	LOCAL / INTERNATIONAL	DESCRIPTION
Kenya	 PowerGen	International	PowerGen was founded in 2011 with the vision of making clean, renewable energy accessible to more people in Africa.
	 solarise africa	International	Solarise Africa is a pan-African energy leasing company. The company provides reliable and affordable decentralised energy solutions for businesses in Africa and uses smart financing solutions to unlock possibilities and empower partner companies to thrive and actively drive Africa's progress.
	 Premier Solar Group	International	The Premier Solar Solutions Group is a direct-to-consumer business offering distributed solar PV solutions to the C&I, institutional, agricultural and telecom sectors in East Africa, Middle East and South Asia, with operations currently in Kenya, Uganda, Dubai, Sri Lanka and India.
	 REDAVIA RENTAL SOLAR POWER	International	REDAVIA is a global market leader of cost-effective, reliable, and clean solar power for businesses that deployed its first solar farm in Kenya for Menengai Farmers Ltd tea farm in Tigoni.

NOTE: Information valid as of December 2021.

SECTION 3

Commercial and Industrial Solar Applications in Mozambique



This section describes C&I solar applications in the context of Mozambique, including a review of four C&I sectors (agricultural processing, fisheries, tourism and mining) and profiles C&I solar suppliers that are active in the country.

While C&I solar applications can save money for businesses operating in off-grid areas (that often depend on expensive diesel generators for power), for grid-connected businesses, investing in C&I solar makes sense only if the electricity they purchase from the utility is either more expensive than the solar technology or if the service is unreliable. In Mozambique, the average electricity tariff for medium voltage commercial and industrial customers (which is a benchmark used to assess the viability of C&I solar projects) is approximately EUR 0.07/kWh, and the reliability of the grid may vary from one network to the next. The main grids in the Northern provinces of the country generally experience more frequent interruptions than the grid around Maputo and in the South (and thus rely more on diesel backup generators). Average electricity tariffs in Mozambique are expected to increase in the near and medium term, as the government and EDM attempt to move closer to cost-reflective tariffs.

3.1 COUNTRY OVERVIEW

There are many off-grid business sectors in Mozambique that can benefit immediately from C&I solar solutions, including agro-processing, fisheries, mining and tourism, among others. The Mozambican economy is dominated by the agriculture sector, which employs more than 80% of the labour force and contributes about 25% of GDP.³³ In the mining sector, most investments and projects are concentrated on graphite, precious and semi-precious stones, heavy sands and coal.³⁴ Mozambique attracts tourists by virtue of its 2,500 kilometres of coastline along the Indian Ocean, as well as several national parks (e.g., Bazaruto National Park and Gorongosa National Park).

In 2020, Mozambique experienced its first economic contraction in nearly three decades, as the COVID-19 pandemic suppressed economic demand, disrupted supply chains and delayed critical infrastructure investments. The economy is still recovering from a slowdown in real GDP growth to 2% in 2019 (compared to 3.3% in 2018) after two cyclones—Idai and Kenneth—hit the country in 2019 and caused unprecedented destruction, leading to a humanitarian crisis.³⁵ Security also remains an ongoing concern, particularly in the northernmost Cabo Delgado Province, where attacks by an insurgency group against the civilian population have created a dangerous and unstable environment and displaced thousands of people. The situation has also led to the suspension of natural gas development in the offshore Rovuma Basin, which has the potential to generate substantial wealth and prosperity for the country in the long-term.³⁶ Mozambique is administratively divided into three regions (south, central and north) and 11 provinces. The country has a low demographic density, as about two-thirds of Mozambicans live in dispersed rural areas mainly concentrated along transport corridors and the coastline.³⁷

3.2 ELECTRICITY SECTOR PROFILE

Rates of electricity access vary substantially across Mozambique's provinces and districts, with higher levels of access in the southern region (Figure 3). In 2022, the national electrification rate was 51%, with a considerable difference between rates of access in urban and rural areas.³⁸ The government aims to achieve universal electricity access by 2030 through grid extensions, densification and off-grid solutions.

33) "Mozambique at a glance," UN Food and Agricultural Organization (FAO): <http://www.fao.org/mozambique/fao-in-mozambique/mozambique-at-a-glance/en/>

34) De Amaral, L., and Mussagy, K., "Mining in Mozambique: Overview," SAL & Caldeira Advogados, (1 September 2019): [https://uk.practicallaw.thomsonreuters.com/0-575-3315?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/0-575-3315?transitionType=Default&contextData=(sc.Default)&firstPage=true)

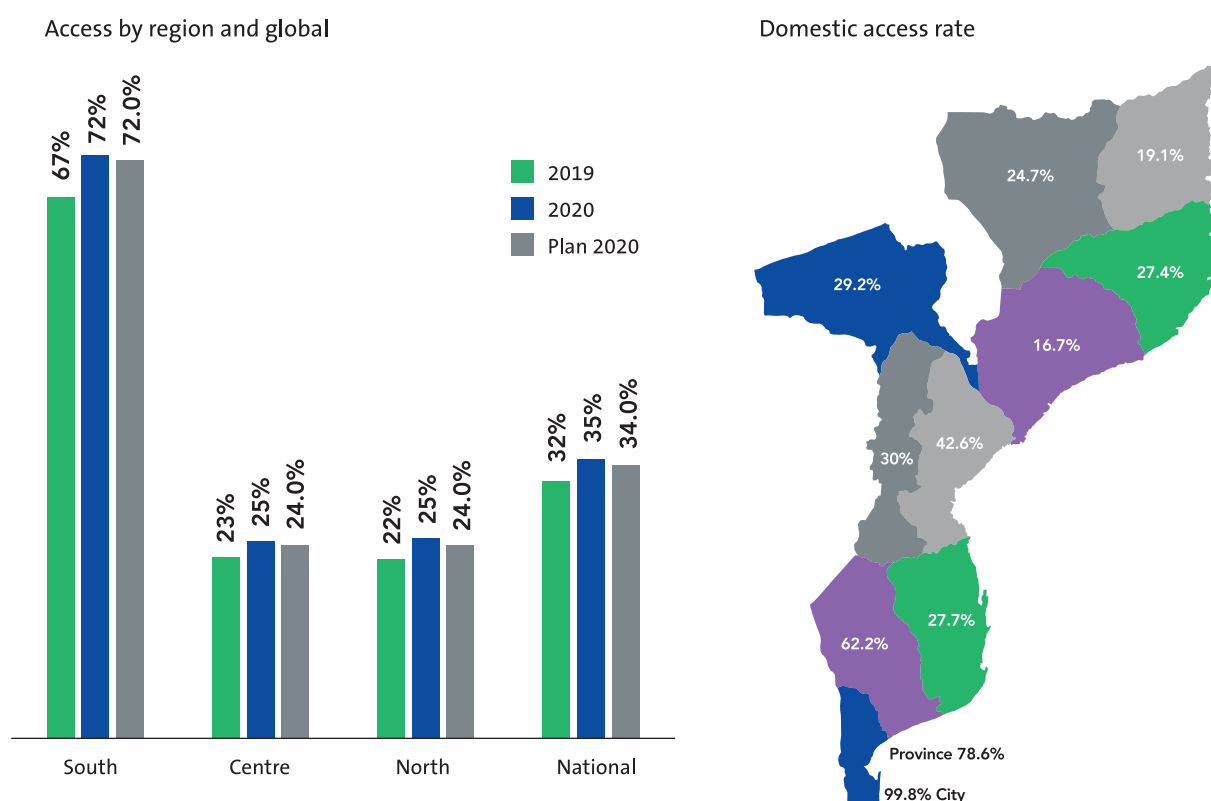
35) Naidoo, K., and Loots, C., "Mozambique - Energy and The Poor: Unpacking the Investment Case for Clean Energy," UN Capital Development Fund (UNCDF), (2020): <https://www.uncdf.org/article/6474/energy-and-the-poor-unpacking-the-investment-case-for-clean-energy>

36) Abrahamson et al., "Mozambique: Mobilizing Extractive Resources for Development," Columbia School of International and Public Affairs, (May 2013): https://mozambiqueextractivedevelopment.weebly.com/uploads/1/1/0/9/11096909/mozambique_-_extractives_for_prosperity_reduced_3.pdf

37) "Renewables in Mozambique: National Status Report, 2nd Edition," Associação Lusófona de Energias Renováveis (ALER), (October 2017): <https://www.aler-renovaveis.org/en/activities/publications/national-reports/renewables-in-mozambique--country-status-report/>

38) "Briefing: Renewables in Mozambique 2022," Associação Lusófona de Energias Renováveis (ALER), (December 2022): https://www.lerenovaveis.org/contents/lerpublication/a4_resumo_renov_moz_2022_vfinal.pdf

FIGURE 3. Rates of electricity access by region, 2019-2020 (left) and province, 2020 (right)³⁹



Source: Electricity of Mozambique (Electricidade de Moçambique, EDM), 2020.

To achieve its electrification target, the government adopted the National Electrification Strategy (NES) in 2018, which promotes institutional, technical, financial and regulatory reforms to the electricity market and provides a framework for private sector participation.⁴⁰ In 2019, with funding from the World Bank and other development partners, the GoM launched the “Electricity

for All National Programme” (*Programa Nacional de Energia para Todos*) to plan and coordinate efforts to provide all Mozambicans with electricity access by 2030. This programme was the main cause for the recent off-grid market growth observed in the recent years. Unfortunately, most actions taken by the GoM through the programme did not cover the C&I market.

39) Electricidade de Moçambique Relatório e Contas, Annual Report, 2020: <https://www.edm.co.mz/en/node/5321>

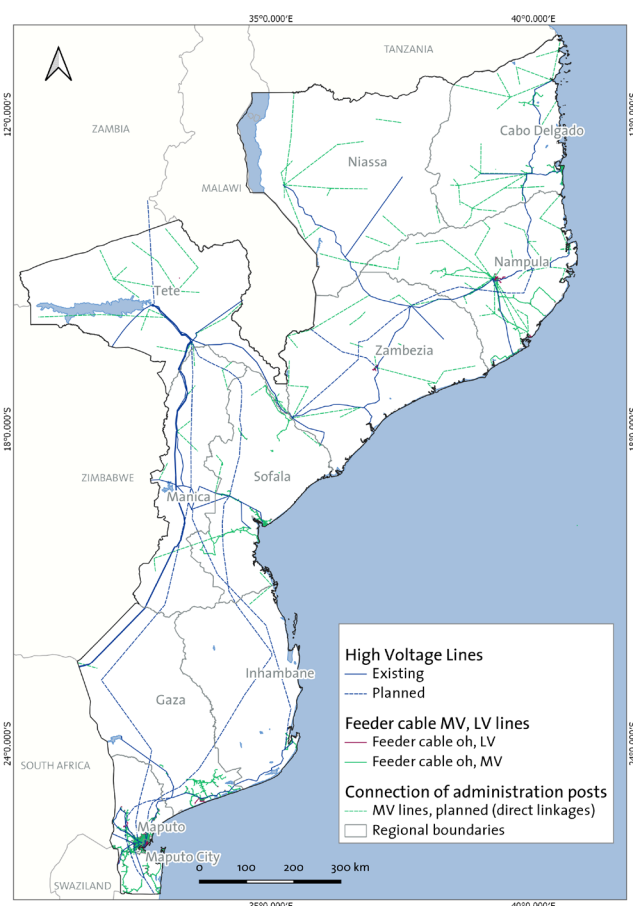
40) National Electrification Strategy, 2018-2030. Ministry of Mineral Resources and Energy, Government of Mozambique.

The electricity market is vertically integrated, with the state-owned utility, Electricidade de Moçambique (EDM), responsible for the generation, transmission, distribution, and retail sale of electricity. EDM sources most of the country's power from the Cahora Bassa hydropower plant (Hidroelétrica de Cahora Bassa, HCB) and supplies the remaining balance through a combination of diesel fuel, gas-fired generation and solar energy. The government has recently undertaken reforms to the electricity market to allow for private independent power producers (IPPs) to sell power to EDM.⁴¹ Electricity demand, which is expected to increase in the coming decades, is mainly driven by extractive industries (e.g., mining), infrastructure development and other economic activities concentrated around urban areas.⁴²

The EDM grid network is not yet fully interconnected, with three separate grids in the country's southern, central and northern regions (Figure 4). Given the country's large size and low population density, large swaths of rural Mozambique will remain off-grid through 2030, served by solar home systems, mini-grids and C&I solutions for rural businesses.

Table 4 describes the institutions in Mozambique's electricity sector most relevant to the C&I solar sector.

FIGURE 4. Map of EDM national electricity grid network



Source: Electricity of Mozambique (Electricidade de Moçambique, EDM); prepared by Energo Verda Africa.

41) IPPs in the market include Sasol Limited (in partnership with National Oil Company, ENH), Aggreko, Scatec Solar (Mocuba Solar Project) and Neoen (Metoro Solar Project).

42) "Energy Catalyst - Country Guide: Mozambique," Innovate UK and UK Aid, (June 2020): <https://energycatalyst.ukri.org/wp-content/uploads/2023/06/Country-Guide-Mozambique.pdf>

TABLE 4. Energy institutions and market actors relevant to the C&I sector in Mozambique

INSTITUTION / MARKET ACTOR	DESCRIPTION / RESPONSIBILITIES
Ministry of Mineral Resources and Energy (Ministério dos Recursos Minerais e Energia, MIREME)	<ul style="list-style-type: none"> Ministry responsible for overall energy sector planning, policy development and implementation, as well as management and oversight of all energy sector programmes and initiatives to achieve energy policy objectives. All electricity sector activities, including the C&I solar sector, are therefore dependent on the objectives and goals set by the Ministry.
Mozambique Energy Fund (Fundo de Energia, FUNAE)	<ul style="list-style-type: none"> Government institution under MIREME responsible for providing funding and assistance to develop projects that expand access to low-cost energy services in rural and urban areas and promote sustainable management and conservation of energy resources. Coordinating government agency responsible for off-grid sector projects, programmes and activities, with primary focus on the construction of the stand-alone market segment, micro-grids and mini-grids. Does not have a direct impact on the C&I market, but its access project may have an indirect influence on the C&I solar sector. For example, depending on tariffs set for the mini-grid location, C&I solar may not be viable if the tariff is low and the electricity generated by the mini-grid is reliable.
National Directorate for Electrical Energy (NDEE)	<ul style="list-style-type: none"> Central technical body within MIREME responsible for the analysis, preparation and elaboration of energy policies.⁴³ As an entity involved in the energy policy development, it can influence the C&I solar market.
Energy Regulatory Authority (Autoridade Reguladora de Energia, ARENE)	<ul style="list-style-type: none"> Regulatory authority responsible for ensuring compliance with the laws and regulations governing the electricity sector, protecting the public interest and guaranteeing continuity and quality of service. Responsible for issuing licences to IPPs for electricity generation, the establishment and approval of electricity prices and tariffs and control of the maximum prices of some petroleum fuels. It is not currently the case for the C&I solar sector, but in the future, ARENE may be responsible for defining the tariff at which C&I solar could sell excess solar production into the grid.
Ministry of Land and Environment (Ministério da Terra e Ambiente, MTA)	<ul style="list-style-type: none"> Ministry responsible for overseeing sustainable management of land resources and the environment. Responsible for the environmental licensing of projects. Previously the Ministry of Coordination of Environmental Affairs (MICOA) and the Ministry of Land, Environment and Rural Development (MITADER).
Electricidade de Moçambique (EDM)	<ul style="list-style-type: none"> Integrated, state-owned national electricity utility responsible for generation, transmission, distribution and retail sale of electricity. Works with MIREME and FUNAE on power sector planning. It could be a key player in improving the enabling environment for the C&I solar sector if they are to absorb excess energy produced by C&I solar.

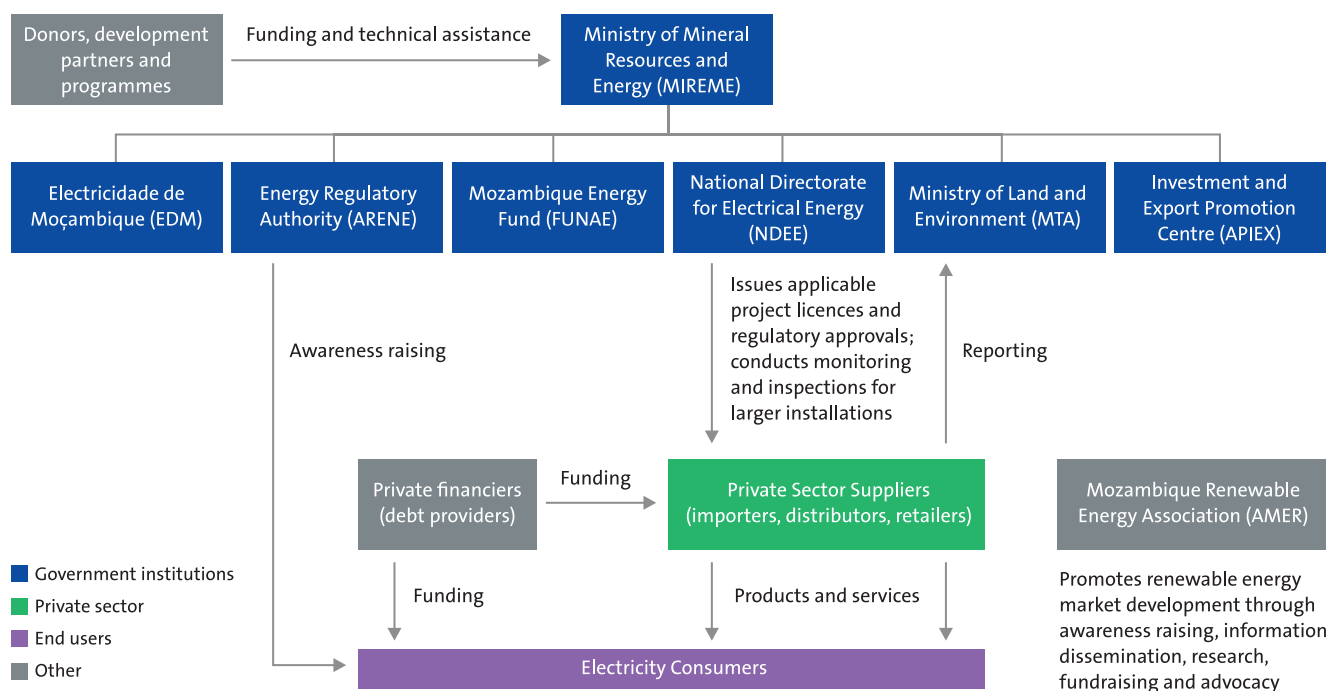
43) "Integrated Master Plan Mozambique Power System Development Final Report," Japan International Cooperation Agency (JICA), (February 2018): <https://openjicareport.jica.go.jp/pdf/12318606.pdf>

TABLE 4. Continued

INSTITUTION / MARKET ACTOR	DESCRIPTION / RESPONSIBILITIES
Investment and Export Promotion Centre (Agencia para Promoção de Investimentos e Exportações, APIEX)	<ul style="list-style-type: none"> Public institution created by the merger of the Investment Promotion Centre (CPI), the Special Economic Zones Authority (GAZEDA) and the Institute for Export Promotion (IPEX). Responsible for facilitating and working with private investors. Registered companies and projects may qualify for several fiscal incentives from APIEX.
Mozambique Association of Renewable Energies (AMER)	<ul style="list-style-type: none"> Non-profit association promoting renewable energy and sustainable development in Mozambique through active discourse with political, economic and social decision-making bodies.

Figure 5 shows the relationships between the energy sector institutions and market actors most relevant to the C&I solar sector in Mozambique.

FIGURE 5. Energy institutions and market actors in Mozambique



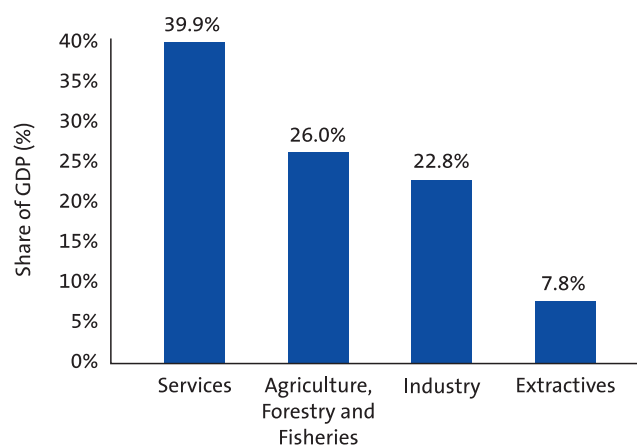
Source: Electricity of Mozambique (Electricidade de Moçambique, EDM), 2020.

3.3 COMMERCIAL AND INDUSTRIAL SECTORS IN MOZAMBIQUE

Demand for electricity in Mozambique's C&I market is largely driven by the tourism, forestry, fisheries, agro-processing and mining sectors. According to official government figures, in 2019, the services sector, including tourism, made up 41% of Mozambique's GDP. The agriculture, forestry and fishing sectors contributed to 27% of GDP, while industry, which includes agro-processing, accounted for 24% of GDP (Figure 6).

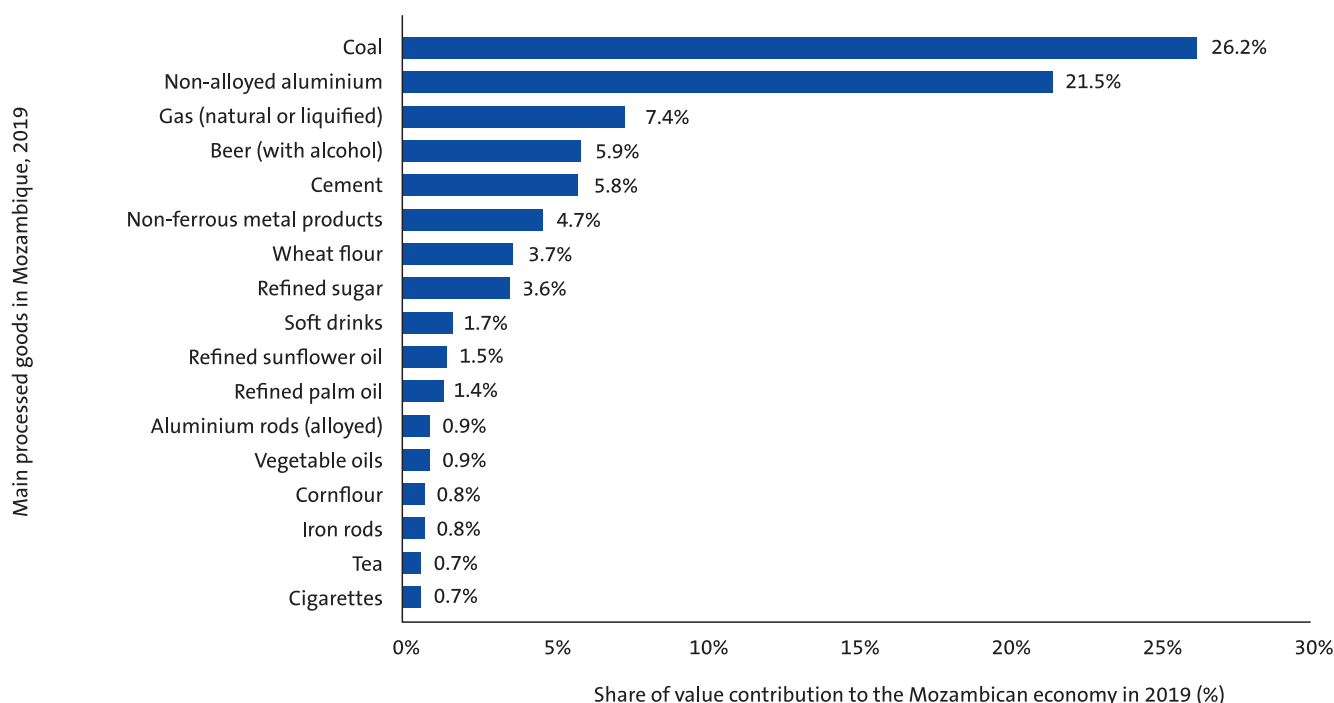
Figure 7 provides a detailed breakdown of Mozambique's C&I sectors and their contributions to GDP in 2019. The mining sector, which brings in a large share of the country's revenue, frequently operates in off-grid areas and/or requires backup power supply. For example, Australian graphite mining company, Syrah Resources, utilises an 11.2 MWp solar-hybrid system to power its operations in Balama, Cabo Delgado Province.⁴⁴

FIGURE 6. Breakdown of GDP by sector, 2019



Source: National Institute of Statistics (Instituto Nacional de Estatística, INE), 2021.

FIGURE 7. Share of value contribution of main processed goods, 2019 (%)



Source: National Institute of Statistics (Instituto Nacional de Estatística, INE), 2021.

44) "Syrah signs MoU for solar and battery project at Balama," Associação Moçambicana de Energias Renováveis (AMER), (January 20, 2021): <https://company-announcements.afr.com/asx/syr/7a2d65ce-43e5-11eb-ba8c-7ab64016da7f.pdf>

Processed food and drinks such as beer, flour, sugar and vegetable oil are among the top contributors to GDP. Although processing centres are in grid-connected areas, there is potential for these companies to use C&I solar to complement their grid power and compensate for grid instability, mainly in the North and Centre Regions of the country.

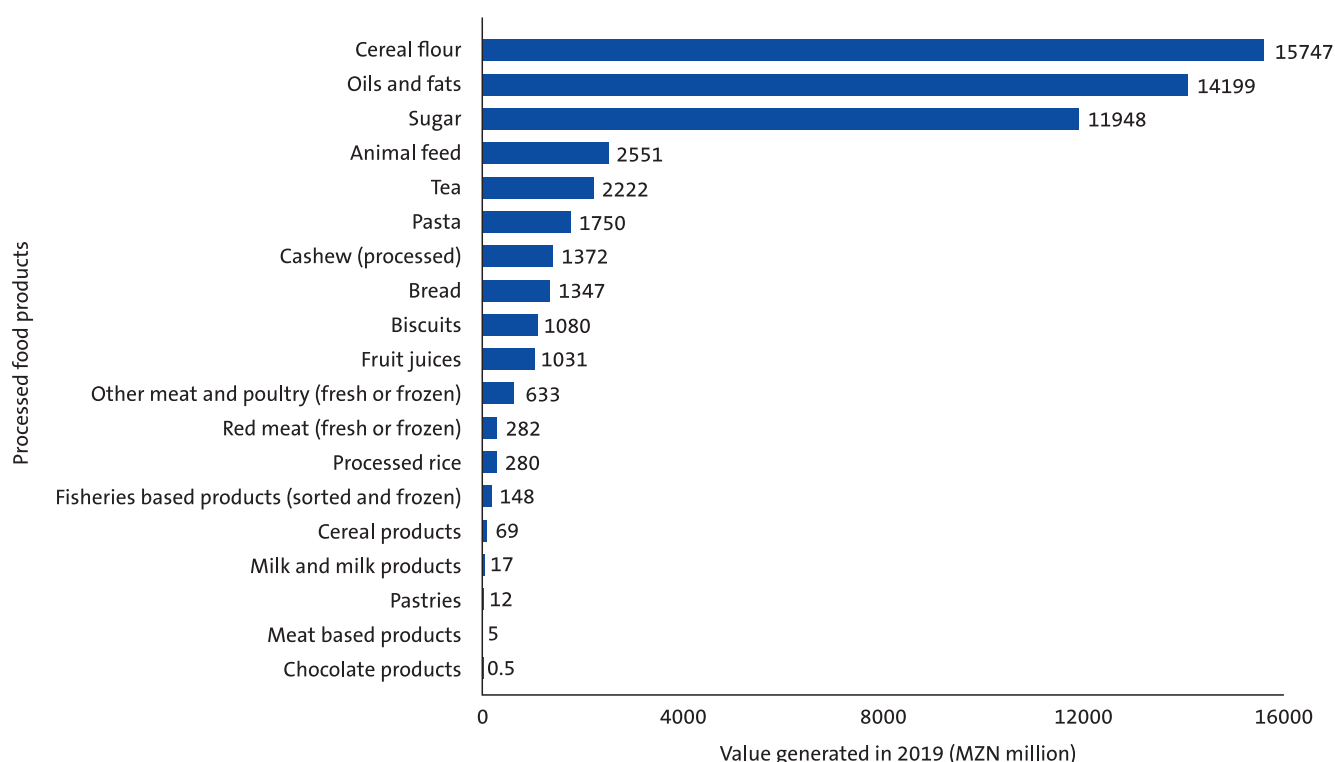
Agricultural processing

The agricultural sector in Mozambique provides subsistence and income generation for more than 80% of the population. The country has significant untapped potential for agriculture; only about 15% of arable land is currently being cultivated.⁴⁵ The vast majority of farms are run by smallholder farmers, which suggests that more emphasis is needed on small-scale productive use of

energy (PUE) equipment, such as solar pumping and irrigation systems, solar mills and solar-powered cold storage systems. In contrast, the market for C&I solar applications more closely aligns with larger-scale industrial farming operations (e.g., agro-processing enterprises) or sectors where smallholder farmer output is aggregated, such as in the processing and export of cash crops such as cashews, cotton and tobacco.

Figure 8 and Figure 9 disaggregate the main processed food and beverage products according to the value that each sector generates for the economy, respectively.⁴⁶ The sectors generating the most value signal potential C&I focus areas within the agro-processing sector.

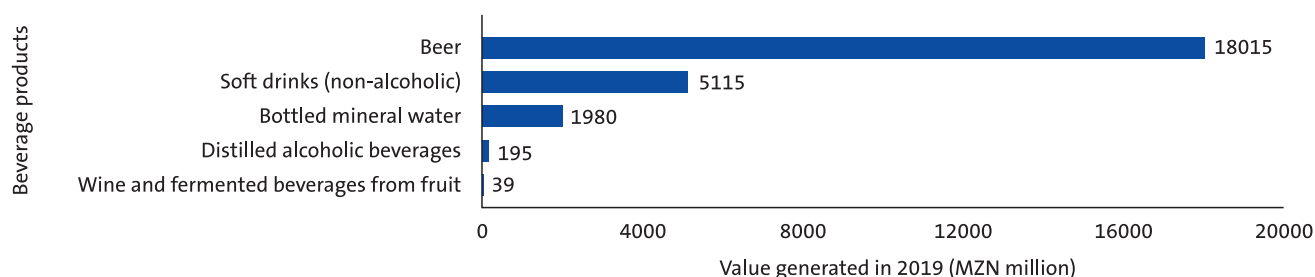
FIGURE 8. Value generated by processed food products, 2019 (MZN million)



Source: National Institute of Statistics (Instituto Nacional de Estatística, INE), 2021.

45) "Agriculture and food security in Mozambique," USAID, (March 24, 2021): <https://www.usaid.gov/mozambique/agriculture-and-food-security>

46) "Estatísticas Industriais, 2019," Instituto Nacional de Estatística, Moçambique, (2019): https://www.ine.gov.mz/web/guest/d/publicaestatisticas-industriais-2019_20200928

FIGURE 9. Value generated by beverage products, 2019 (MZN million)

Source: National Institute of Statistics (Instituto Nacional de Estatística, INE), 2021.

Agro-processing facilities in Mozambique are both foreign and domestically owned. An analysis of foreign investments approved by the Agency for the Promotion of Investment and Exports (APIEX) found that – excluding the oil and gas sector – agriculture was the largest foreign direct investment (FDI) recipient, with almost USD 3B invested between 2007 and 2017, representing 27% of all FDI (excluding oil and gas).⁴⁷

Table 5 shows the number and location of processing centres, distinguishing between on-grid and off-grid areas. According to the National Institute of Statistics (Instituto Nacional de Estatística, INE), in 2020, there were approximately 15 agricultural processing plants operating in off-grid areas of the country and 377 plants operating with access to grid power. Tete and

Zambezia Provinces are home to the most off-grid facilities. The farther north a province – Zambezia, Tete, Nampula, Niassa and Cabo Delgado – the more likely its businesses are to be off-grid or otherwise reliant on unstable grid power.⁴⁸ When considering the system average interruptions frequency index (SAIFI) for the northern provinces compared to the south, the data reveals that there are close to six times more interruptions in the northern provinces. Similarly, the system average interruption duration index (SAIDI) is considerably higher.⁴⁹

47) “Republic of Mozambique Agrarian Sector Transformation: A Strategy for Expanding the Role of the Private Sector,” World Bank, (2019).

48) On average, processing plants spend around MZN 525k (EUR 7,700) on their electricity bill each month. Additional backup diesel generator costs for grid-connected factories operating in northern Mozambique amount to MZN 50k (EUR 750) per month. Blackouts in Nampula Province were reported to occur on average 12 times on a monthly basis and last for about two hours in duration. Fewer blackouts were reported by plants operating in southern Mozambique (Gaza Province). (Source: Stakeholder interviews and site visits, 2021).

49) EDM Annual Report 2020: <https://www.edm.co.mz/pt/document/reports-reports-and-accounts/relatório-e-contas-2020>

TABLE 5. Number of agricultural processing plants in off-grid and on-grid locations by province, 2020

REGION	PROVINCE	OFF-GRID	ON-GRID
South	Maputo Province	0	33
	Maputo City	0	122
	Gaza	1	12
	Inhambane	1	20
Centre	Sofala	2	38
	Manica	0	28
	Tete	4	39
	Zambezia	4	47
North	Nampula	0	10
	Cabo Delgado	2	17
	Niassa	1	11
	Total	15	377

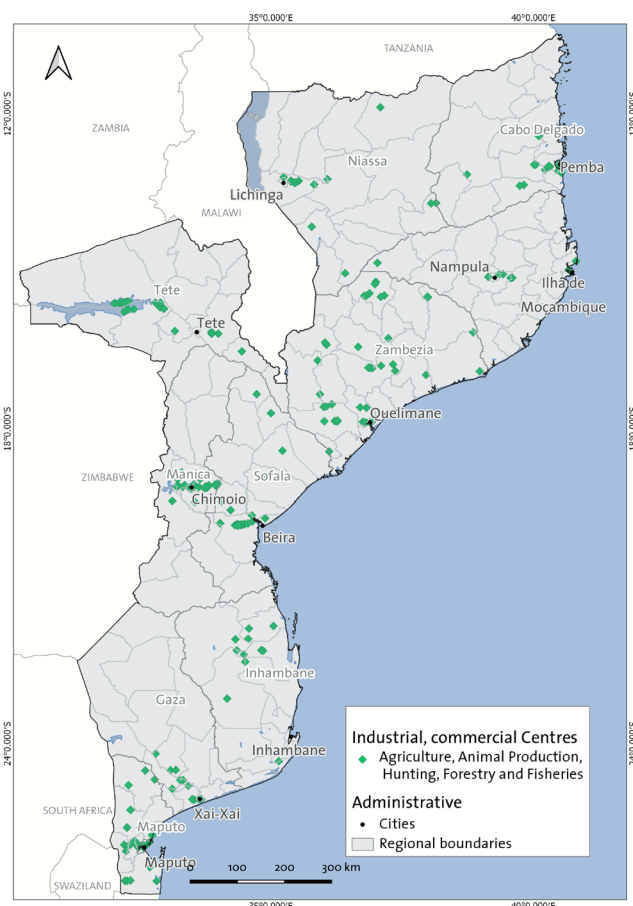
Source: National Institute of Statistics (Instituto Nacional de Estatística, INE), 2020.

Figure 10 is a map of commercial and industrial agricultural processing centres in Mozambique.

Fisheries

The fisheries sector is another major contributor to the Mozambican economy and is the primary source of protein for a significant share of the population. More than 90% of the annual fish catch is by artisanal fishermen, 7% by industrial fishing and the remaining by semi-industrial fishermen for local consumption.⁵⁰ The industrial catch, consisting mostly of crustaceans for export, represents about 52% of the total commercial value, while artisanal fishing makes up around 42%. The remaining 6% comes from semi-industrial fishing.⁵¹

FIGURE 10. Map of C&I agricultural processing centres in Mozambique



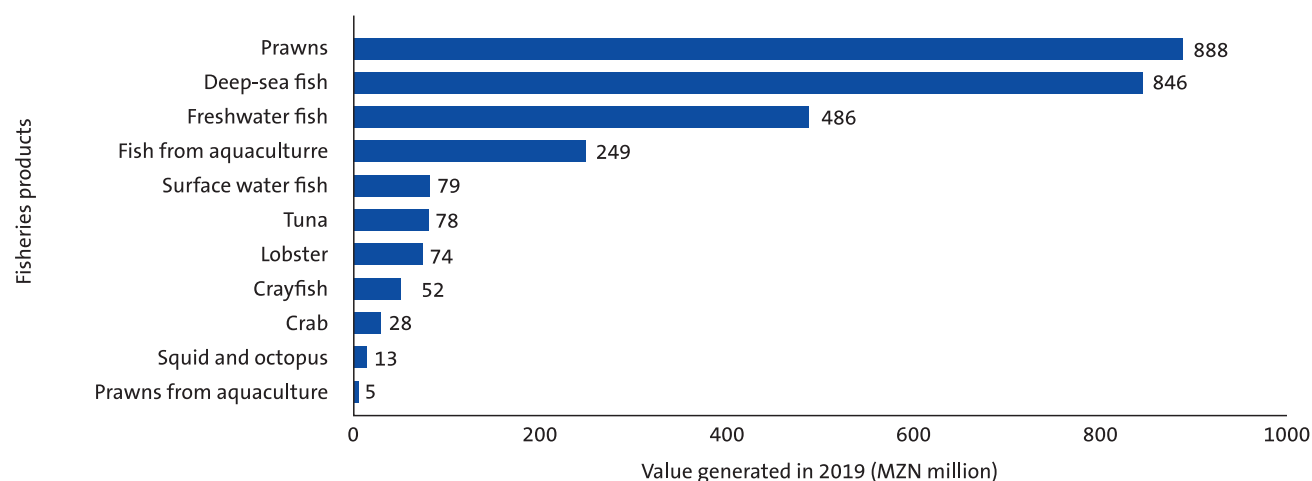
Source: National Institute of Statistics (Instituto Nacional de Estatística, INE); prepared by Energo Verda Africa.

Figure 11 provides a breakdown of the economic value of various industrial and semi-industrial fisheries in Mozambique. The data reveals that C&I opportunities should focus on the value chains associated with prawns and deep-sea fish.

50) Observatório do Meio Rural (OMR), Macroeconomia das Pescas em Moçambique (2021): <https://omrmz.org/observador/or-105-macroeconomia-das-pescas-em-mocambique/>

51) Souto, M., "Artisanal Fisheries and Climate Change Project (FishCC): Environmental and Social Management Framework (ESMF)," Instituto Nacional de Desenvolvimento da Pesca de Pequena Escala, (2014): https://ewsddata.rightsindevelopment.org/files/documents/92/WB-P149992_tltArTb.pdf

FIGURE 11. Value generated by industrial and semi-industrial fisheries, 2019 (MZN million)⁵²



Source: National Institute of Statistics (Instituto Nacional de Estatística, INE), 2021.

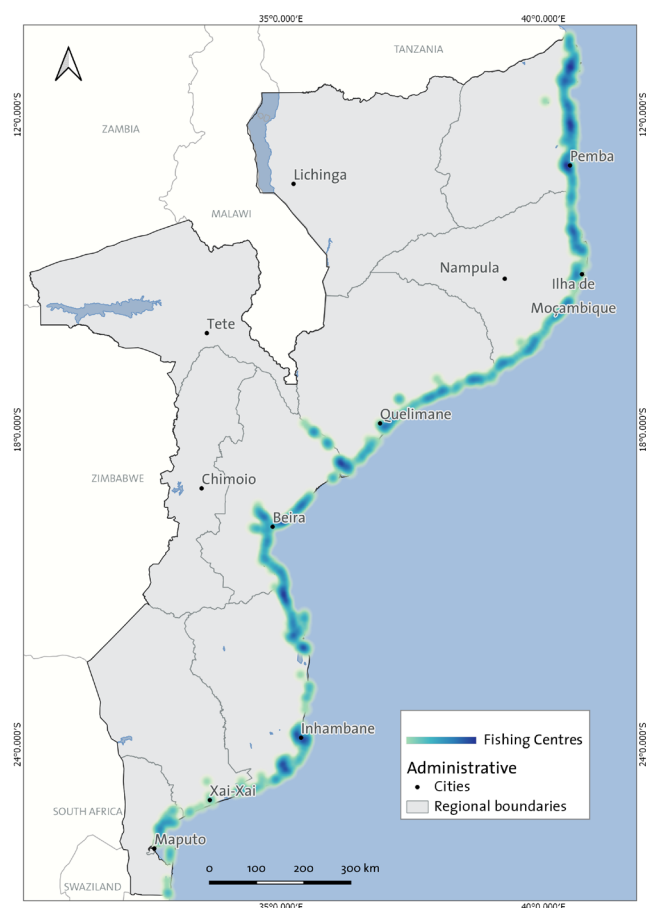
Opportunities for on-site generation of energy using solar exist for fish processing centres and cold storage facilities that require continuous power supply to avoid spoilage. There are an estimated 1,169 fishing centres in Mozambique's coastal provinces (Figure 12), of which around 377 are in interior waters, which include the terminal sections of the main rivers and coastal lagoons.⁵³ Many of these centres are funded by the government with support from its development partners to incentivise sustainable and planned fishing activities. Such centres cater to individual or collective (association-based) fishermen and may include shared facilities such as cold storage, ice making and market stalls. These centres present an opportunity for C&I solar developers to provide equipment when financing is available.

Aquaculture – the practice of raising freshwater or marine organisms in a controlled environment to enhance production rates – is a growing segment of Mozambique's fisheries sector, offering further C&I solar market opportunities across the value chain, from the oxygenation of ponds, to processing and storage of fish and other produce. As an example, Aquapesca, an aquaculture business in Zambezia Province, has considered using solar panels to reduce electricity costs, with the added benefit of increasing shade over fishponds to control the growth of algae.

52) "Anuário Estatístico - Statistical Yearbook, 2019," Instituto Nacional de Estatística, Moçambique, (2019): <https://www.ine.gov.mz/web/guest/d/anuario-estatistico-2019-web-cpl>

53) IPDE, 2014 Artisanal Fisheries and Climate Change Project (FishCC): https://ewsddata.rightsindevelopment.org/files/documents/92/WB-P149992_tltArTb.pdf

FIGURE 12. Map of fishing centres in Mozambique



Source: National Institute of Fish Inspection (Instituto Nacional de Inspecção de Pescado, INIP); prepared by Energio Verda Africa.

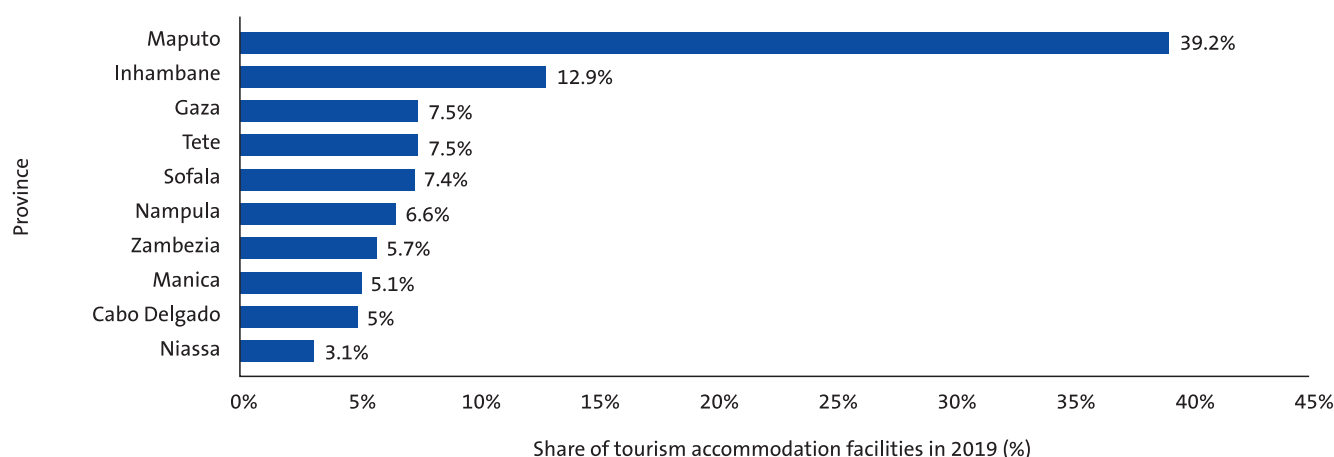
Tourism

Mozambique's vast coastline, warm climate, diversity of flora and fauna and rich cultural heritage make the country a unique tourist destination. The tourism industry is predominantly centred around the country's beaches, with resorts located both on the coastal mainland and on islands. Approximately 25% of Mozambique's land area is designated for conservation in the form of seven National Parks,⁵⁴ 12 National Reserves,⁵⁵ and eight Marine Protected Areas. Additionally, there are other categories of conservation areas, such as official hunting reserves and game farms, three Community Conservation Areas⁵⁶ and several Forest Reserves. In 2019, the tourism sector employed 6.6% of the population and generated EUR 1.15B in revenue, representing 6.2% of total national income that year.⁵⁷

Figure 13 shows the distribution of tourist accommodations by province. The provinces with the most registered tourism businesses are Inhambane, Maputo City, Nampula, Cabo Delgado and Zambezia. Maputo Province has the highest concentration of establishments. Tourism in Maputo City and other main urban areas caters more to business travellers. These establishments are generally grid-connected and could be a market opportunity for backup C&I systems in locations where the quality of grid power supply is unreliable (which is not necessarily the case in Maputo). Tourism establishments along the coast and in conservation areas cater mostly to holiday travellers. These locations typically have less reliable or no grid connection and would rely on independent power sources, representing a potential market opportunity for C&I solar developers.

- 54) Quirimbas, Gorongosa, Mágoè, Bazaruto, Limpopo, Zinave and Banhine.
- 55) Niassa, Gilé, Marromeu, Lake Niassa, Chimanimani, Pomene, Malhazine, Ponta de Ouro and the Inhaca Biological Reserve, the Cape São Sebastião Total Protection Zone, and the Environmental Protection Area of the First and Second Island
- 56) Mitchéu, TchumaTchato and Chipanje Chetu
- 57) Employment in travel and tourism as a share of total employment in Mozambique from 2019 to 2020: <https://www.statista.com/statistics/1257794/share-of-employment-in-travel-and-tourism-mozambique/>

FIGURE 13. Distribution of tourism accommodation facilities by province, 2019⁵⁸



Source: National Institute of Statistics (Instituto Nacional de Estatística, INE), 2021.

Table 6 shows the number and location of tourism establishments by province, distinguishing between on-grid and off-grid areas. According to the INE, in 2020, there were approximately 129 tourism establishments operating in off-grid areas and 3,162 establishments connected to the grid. The data further revealed that 10% of tourism establishments in off-grid areas are of medium-scale,⁵⁹ while 90% are small-scale. No large-scale tourism establishments are registered in off-grid sites.

TABLE 6. Number of tourism establishments in on-grid and off-grid locations by province, 2020

PROVINCE	OFF-GRID	ON-GRID
Gaza ⁶⁰	21	105
Inhambane	8	217
Sofala	11	445
Tete	11	178
Zambezia	32	364
Cabo Delgado	14	121
Niassa	14	152
Manica	0	141
Maputo Province	0	452
Maputo City	0	756
Nampula	18	231
Total	129	3,162

Source: National Institute of Statistics (Instituto Nacional de Estatística, INE), 2020.

58) "Estatísticas do Turismo, 2019," Instituto Nacional de Estatística, Moçambique, (2019): https://www.ine.gov.mz/web/guest/d/estatisticas-do-turismo_2019

59) Size criteria: Small (1-9 workers), Medium (10-49 workers), Large (Above 50 workers).

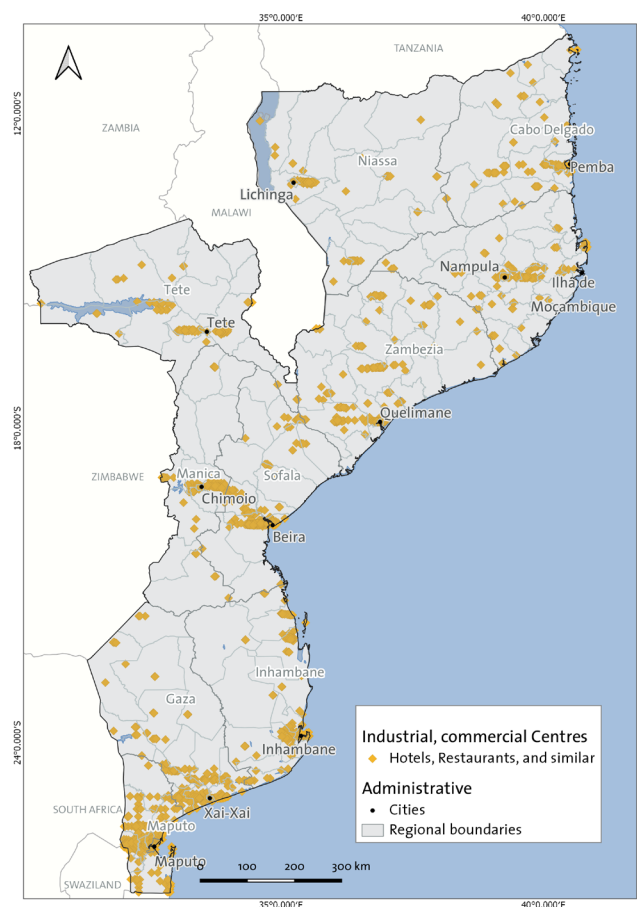
60) Note that Gaza Province is adjacent to the Kruger National Park, across the border in South Africa.

Figure 14 is a map of tourism facilities (hotels, restaurants, etc.) in Mozambique.

Mining

Mozambique has an abundance of coal, natural gas and other mineral resources. The country began exporting coal in 2011 from Tete Province. In 2012, the world's largest natural gas discoveries that year were made in the Rovuma Basin off the coast of Cabo Delgado. The estimated volume of untapped natural gas reserves has since attracted significant investment into Mozambique to develop mega-projects for the production and export of liquefied natural gas (LNG). In addition to hydrocarbons, the country has significant deposits of iron, gold, aluminium, bauxite, titanium, graphite, phosphate, limestone, heavy mineral sands and other minerals (**Box 1**).⁶¹

FIGURE 14. Map of tourism facilities in Mozambique



Source: Ministry of Culture and Tourism (Ministério da Cultura e Turismo); prepared by Energio Verda Africa.

Gold mining is highly concentrated in central Mozambique, where a greenstone belt of rocks runs through Manica Province to neighbouring Zimbabwe.⁶²

BOX 1. Gemstone mining in Nampula Province

One of many off-grid mining and processing centres for precious and semi-precious minerals and gems located in Nampula Province has the capacity to process up to 400 tons of raw material per day. The operation currently relies on two diesel generators to supply its electricity. A 450 kVA generator powers the processing facility with an average monthly consumption of 4,500 litres of diesel. The offices and worker accommodation centre are powered by a 44 kVA generator consuming on average 1,400 litres of diesel per month. The mining operation's management is looking to use solar to relieve this heavy reliance on diesel generators. The excess electricity from solar generation would be shared with the nearby community, which is also not connected to the main grid.

Source: Fineminerals

Most of the country's mining activities are artisanal and small-scale operations. Large-scale commercial mining is driven by FDI, attracted by the vast untapped potential of the country's mineral reserves. The Mozal smelter, located near Maputo City, is an aluminium refinery owned by BHP Billiton that imports electricity from South Africa's Eskom.⁶³

- 61) Pekkala, Y. et al., 2008. "Review of Industrial Minerals in Mozambique," Geological Survey of Finland, Special Paper 48, 307-321, <http://www.acismoz.com/wp-content/uploads/2017/06/Review%20of%20Industrial%20Minerals%20in%20Mozambique.pdf>
- 62) Dondeyne, S. and Ndunguru, E., "Artisanal gold mining and rural development policies in Mozambique: Perspectives for the future," Futures 62 (2014): https://www.researchgate.net/publication/260995411_Artisanal_gold_mining_and_rural_development_policies_in_Mozambique_Perspectives_for_the_future
- 63) "Energy Catalyst - Country Guide: Mozambique," Innovate UK and UK Aid, (June 2020): <https://energycatalyst.ukri.org/wp-content/uploads/2023/06/Country-Guide-Mozambique.pdf>

Despite Mozambique's abundant mineral resources, commercial mining has played a relatively small role in the country's economic development, accounting for only 7.8% of GDP in 2019. A lack of infrastructure and energy are among the key bottlenecks hampering the sector's growth, particularly in remote areas. There are an estimated 425 mining sites in off-grid areas and 855 sites in grid-connected areas across the country, with mining companies and projects concentrated mainly in the provinces of Gaza, Tete, Manica, Nampula and Cabo Delgado ([Table 7](#)).

3.4 PROFILES OF C&I SOLAR SUPPLIERS IN MOZAMBIQUE

Although the C&I solar sector is still in its nascent stages, there are several companies offering equipment and services for C&I solar installations in Mozambique. Commercial and industrial solar market players are mostly international companies that have developed large-scale IPP projects. [Table 8](#) presents profiles of identified renewable energy suppliers active in the C&I solar market segment in Mozambique.

TABLE 7. Number of mining projects in off-grid and on-grid locations by province, 2019

PROVINCE	REGION	OFF-GRID	ON-GRID
Gaza	South	26	15
Inhambane	South	2	66
Sofala	Centre	6	54
Tete	Centre	85	95
Nampula	North	78	158
Cabo Delgado	North	122	155
Niassa	North	10	48
Manica	Centre	51	128
Maputo	South	5	136
Total		385	855

Source: Ministry of Mineral Resources and Energy Database.

TABLE 8. Profiles of renewable energy suppliers in Mozambique

C&I SUPPLIER	DESCRIPTION	CONTACT INFORMATION
 <p>YOUR PARTNER IN THE PORTUGUESE SPEAKING WORLD</p>	<p>Dominio Capital is a private equity boutique focused on Portuguese-speaking countries. Dominio holds Captive Power as its development and investment vehicle for the renewables sector, where it retains a 50% shareholding. Captive Power is an ESCO that focuses on energy awareness, as well as first reducing a client's power needs before using a holistic approach to developing power solutions for C&I users.</p>	<p>Website: www.dominiocapital.com Phone: +351 21 318 28 50 Mail: geral@dominiocapital.com Address: Avenida Marginal, Torres Rani, 6º andar, Maputo, Mozambique</p>
 <p>enserve Moçambique</p>	<p>Enserve offers equipment and services focused on the pump and valve industry. The company also stocks solar energy equipment such as batteries, inverters, charge regulators, PV panels, solar water heaters and solar water pumps. Installation and maintenance services are also provided for the equipment sold.</p>	<p>Website: www.enserve.co.mz Email: info@enserve.co.mz Tel: +258 84 330 5657/8 Address: Av. Rua Da União Africana, Bairro da Matola – “A”, Nº 7666, andar R/C, Cidade da Matola, Maputo.</p>
 <p>Epsilon ENERGIA SOLAR</p>	<p>Epsilon Energia Solar was incorporated in 2018 to serve rural communities by increasing their access to affordable sources of energy. With its headquarters in Maputo, EES is mainly active in the central region of the country with three regional delegations in Chimoio (Manica and Sofala Provinces), Tete (Tete Province) and Gurue (Zambezia Province). The company also caters to C&I consumers in urban and rural areas.</p>	<p>Website: epsilonenergia.co.mz Phone: +258 21 486 560 Address: St. Frente da Libertação nº 355, Maputo, Mozambique</p>
 <p>Logos Industrial</p>	<p>Logos Industrias Lda, an independent company operating in the renewable energy industry with six branches throughout Mozambique, is focused on the study and supply of comprehensive market solutions to ensure the best use of the renewable sources for off-grid and grid-tied applications.</p>	<p>Website: www.logosindustries.com Address: Av. Da Namaacha, nº 492, Bairro Luis Cabral, Maputo</p>
 <p>MATEMO Manutenção Técnica Moçambique</p>	<p>MATEMO Lda was established in 2008 with its headquarters in Maputo and an office in Inhambane. MATEMO entered the renewable energy sector in 2013, also as an independent service organization, specialized in supply, installation and maintenance of hybrid, off-grid and energy storage systems.</p>	<p>Website: www.matemotec.com Phone: +258 21327563 Email: info@matemotec.com Address: Av. Amílcar Cabral 445/RC, Maputo, Mozambique</p>
 <p>POLOSUL</p>	<p>Polo Sul Lda. is active in the Mozambican market as a provider of technical assistance for mechanical installations. They present solutions for preventive and corrective maintenance and technical assistance in the areas of HVAC, hydraulics, electricity and environment.</p>	<p>Website: www.polosul.co.mz Phone: +258 85 596 5336 Email: geral@polosul.co.mz Address: Avenida do Trabalho 1957 Nlhamankulu, Maputo, Moçambique</p>

TABLE 8. Continued









C&I SUPPLIER	DESCRIPTION	CONTACT INFORMATION
	Renewable Future Mozambique Lda. is a sister company of the Renewable Future brand, created in 2015 with the aim of providing engineered renewable energy solutions for residential, commercial and industrial applications in sub-Saharan Africa. This division of the company includes highly-trained consultants and engineers focused on providing expert advice on renewable energy solutions and projects for its clients.	Website: www.renewablefuture.co.za Phone: +258 82 36 21 110 Email: info@renewablefuturemoz.com Address: Rua do Rio Inhamitanga, Prédio n. 63.024, R/C, Cidade de Maputo
	SimSol provides Plug&Play off-grid solar AC systems with storage capacity of 0.5-6 kWh and hybrid systems in the range of 3-50 kW for homes, lodges, public facilities and small businesses. They also design, finance, install and perform O&M for C&I clients with installed capacity of 0.5-5 MW. The installation can be placed on the roof, ground or car parking area.	Website: https://simsol.co.mz/ Phone: +258 84 906 5714 Address: Maputo, Mozambique
	Soelec Mozambique opened a department in 2018 dedicated to renewable energies, especially solar energy. The company provides projects and/or services in the areas of water collection and production to populations, irrigation systems and self-consumption systems off-grid, either as a consultant or EPC.	Website: www.soelec.co.mz Phone: +258 21 422 878 Email: geral@soelec.co.mz Address: Av. Fernão Magalhães, 1098 Maputo Moçambique
	Source Energia is a diversified renewable energy platform focused on the development, finance, construction, management and operations & maintenance of large and small-scale on- and off-grid renewable energy in Lusophone Africa. The team has deep insight into local commercial and regulatory frameworks, know-how of current best practices for renewable energy projects and over 70 years of combined experience.	Website: www.source.capital Phone: +258 21 321 806 Address: Millennium Park Building Av. Vladimir Lenine, 174, 13ª Maputo Mozambique
	Sun Power Engineering is a Mozambican company funded with 100% Mozambican capital with the aim of helping to grow and develop Mozambique by providing unique and innovative renewable energy solutions for the residential, commercial and industrial sectors.	Website: www.Sunpowermz.com Phone: + 258 85 268 7165 Email: info@sunpowermz.com Address: Rua da Mozal, Matola, Mozambique
	SwissSolar Lda. is a competence centre for photovoltaic and renewable energy. Their core business is the implementation of reliable and clean energy solutions for their customers. They are an EPC partner for quality off-grid, hybrid and back-up energy production projects.	Website: www.swissolar.co.mz Phone: +258 84 048 54 54 Email: andreas@SwissSolar.co.mz Address: Av. 24 de Julho N° 3549 - 8º andar / Esquerdo - primeira porta MAPUTO – Mozambique

TABLE 8. *Continued*

C&I SUPPLIER	DESCRIPTION	CONTACT INFORMATION
	<p>Tel Consultores Lda. is a Mozambican company founded in 2015 to provide services in the areas of energy, energy efficiency and automation. The services provided cover all the phases inherent to the elaboration, studies, project planning and execution of work.</p>	<p>Phone: +258 85 071 3435 Email: telconsultores@sapo.mz Address: Nampula City, Mozambique</p>
	<p>TotalEnergies seeks to leverage their footprint in Mozambique to develop and operate solar, wind and hydro power plants. Their focus is on utility scale projects as well as large C&I installations. Their renewable installations are currently limited to solarization of their service stations throughout the country. The solution can be expanded to C&I clients who are looking to achieve similar objectives.</p>	<p>Website: renewables.totalenergies.com/en Phone: +25821500000 Address: Av. Julius Nyerere, no. 3412, JN3412 Office Park, Maputo, Mozambique</p>

SECTION 4

Route to Market



Source: Enteria

This section explores the “Route-to-Market” – i.e., how to leverage the market research presented in this Guide to engage in the C&I solar sector in Mozambique.

4.1 INVESTMENT OPPORTUNITIES AND MARKET SIZING

The C&I solar market sizing estimation for Mozambique presented in this section covers the four sectors described in [Section 3.3](#): (i) agro-processing; (ii) fisheries; (iii) tourism; and (iv) mining. These sectors were selected based on their strong potential to benefit from C&I solar technology applications.

C&I solar market potential for the agro-processing sector

The estimated C&I solar market size for the agro-processing sector focuses on cereals (including rice), oil and cashews, as these products generate significant value for the Mozambican economy (see [Figure 8](#)) and also require a considerable amount of electricity for their processing. For each of the three selected products, the analysis examines the electricity needs of a number of agricultural processing facilities in the country ([Table 9](#)).

TABLE 9. Types of agricultural processing facilities and their energy consumption

TYPE OF PROCESSING FACILITY	NUMBER OF FACILITIES	AVERAGE MONTHLY ENERGY CONSUMPTION (KWH)
Cereal (milling)	27	24,150
Cashew	26	50,400
Oil	19	182,712

The market sizing was calculated based on the number of each type of processing facility and the facility’s estimated energy consumption ([Figures 15-17](#)). The estimated total C&I solar market potential for the agro-processing sector is 49.7 MWp, for a total value of EUR 85.8M, of which 11 MWp (EUR 47.1M) are off-grid and 38.7 MWp (EUR 38.7M) are on-grid. This is a conservative estimate for the market potential given that processing facilities for other products are not included. The financial difference between the on- and off-grid market values is due to the fact the off-grid systems include battery storage, while the grid-connected systems do not.

[Annex A](#) provides more details on the market sizing methodology and assumptions.

FIGURE 15. Estimated C&I solar market potential for the agricultural processing sector (MWp)

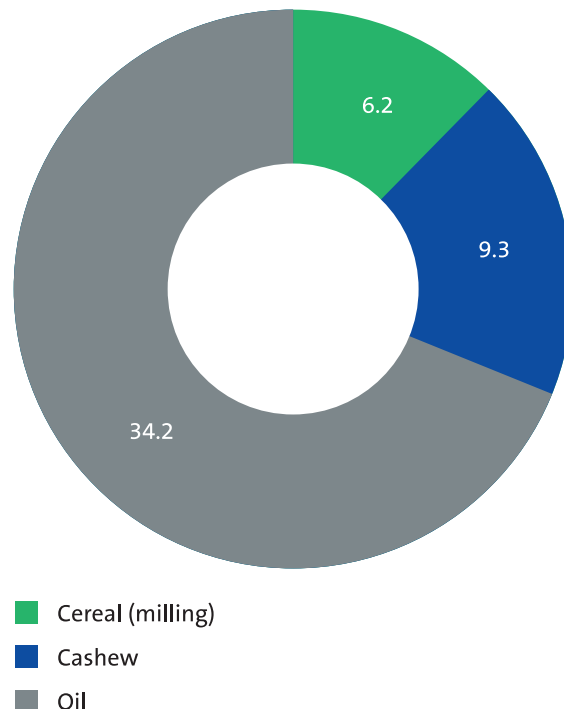
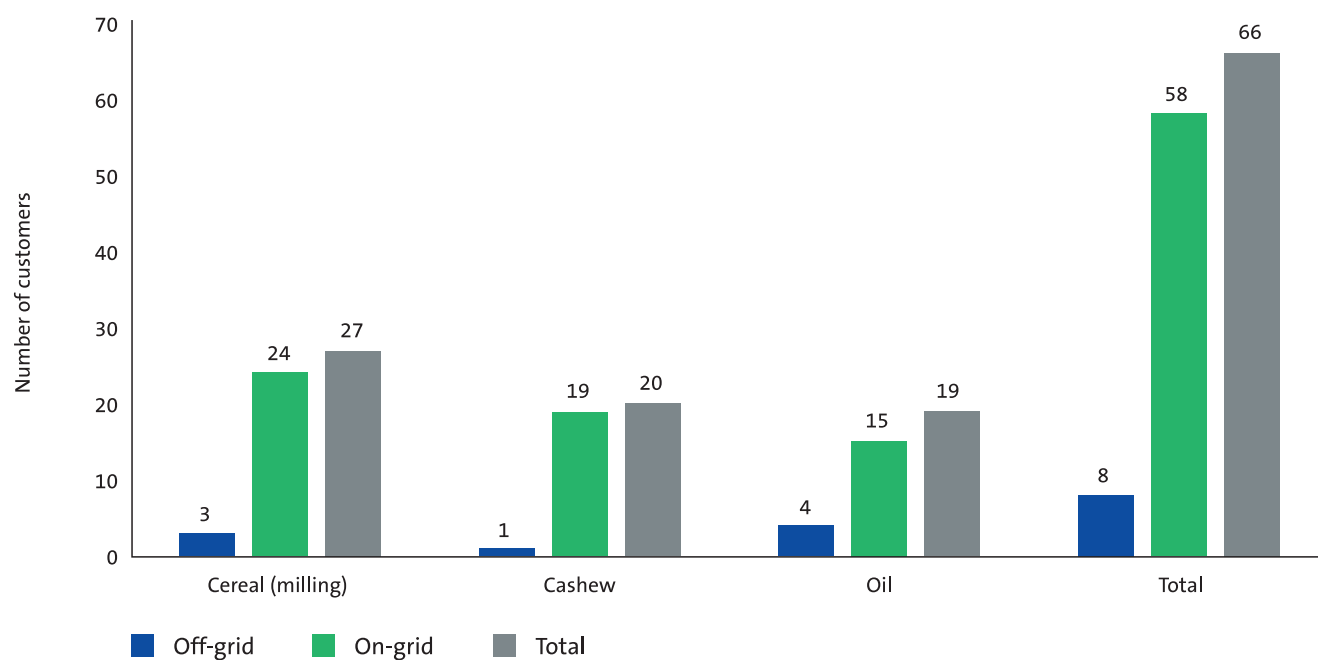
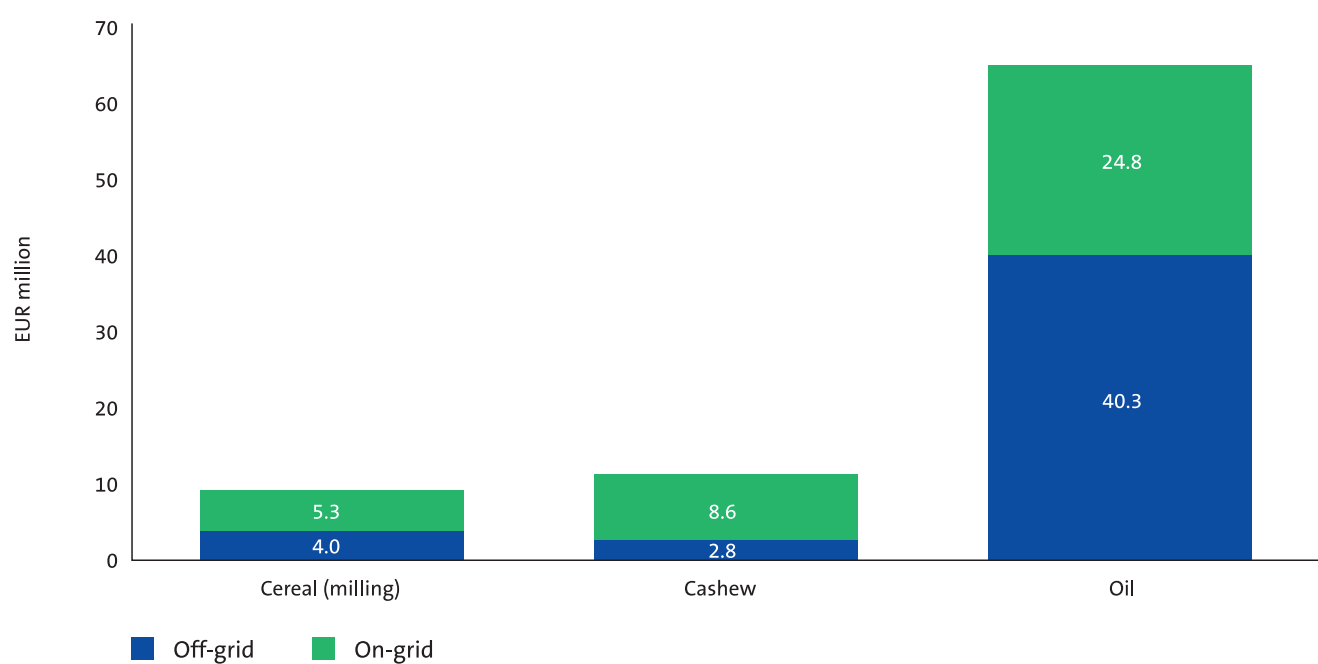


FIGURE 16. Estimated C&I solar market potential for the agricultural processing sector (number of customers)**FIGURE 17.** Estimated C&I solar market value for the agricultural processing sector (EUR million)

C&I solar market potential for the fisheries sector

As described in [Section 3.3](#), the fisheries sector is another important contributor to the Mozambican economy. Most of the country’s 1,169 identified fishing centres are used for artisanal fishing. Only licensed processing/conservation fisheries centres were considered for the purposes of this study. A total of 36 licensed facilities were analysed (all of which were onshore).

Four types of onshore processing facilities were identified, including (i) cold storage, (ii) ice manufacturing, (iii) aquatic life animal yards and (iv) aquaculture. The estimated C&I solar market potential for the fisheries sector was estimated based on the number of processing facilities across the country and the estimated energy needs for each type of facility. The estimated total C&I market potential for the fisheries sector is 14 MWp (all grid-connected), for a total value of EUR 13.95M ([Figures 18-20](#)).

The relatively small market opportunity can be attributed to the low estimated solar capacity needed for this sector compared to the agro-processing sector. There is, however, a significant opportunity to provide off-grid cold storage technology solutions to the sector, which are more commonly defined as off-grid productive use of electricity rather than as C&I applications.

FIGURE 18. Estimated C&I solar market potential for the fisheries sector (MWp)

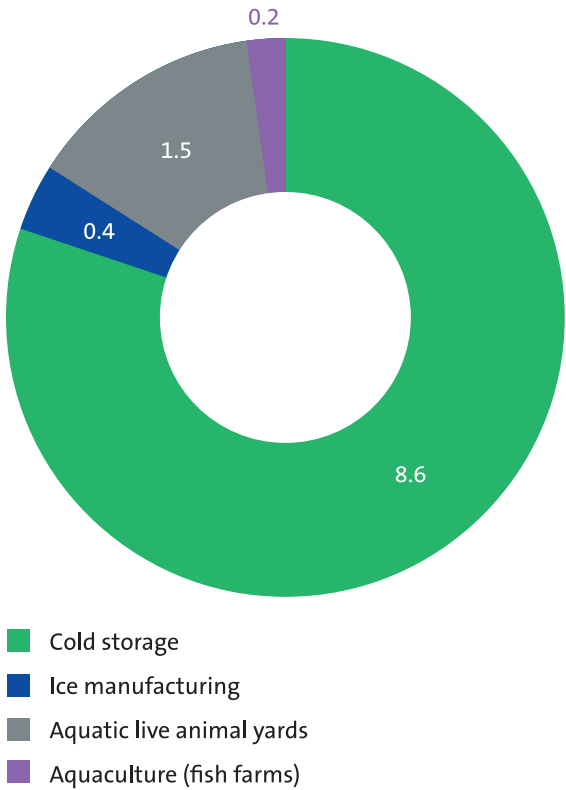


FIGURE 19. Estimated C&I solar market potential for the fisheries sector (number of customers)

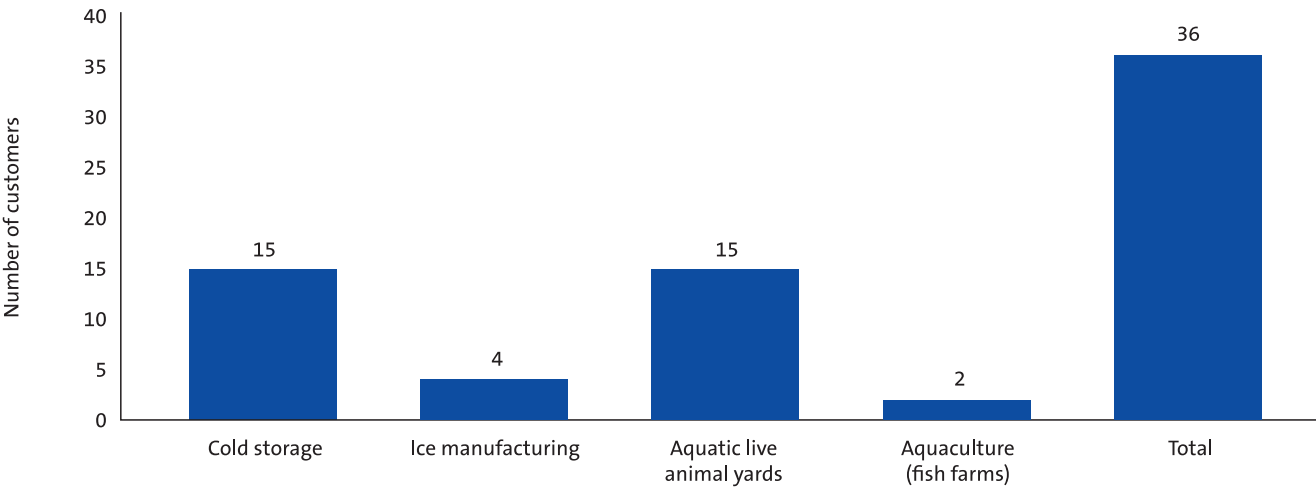
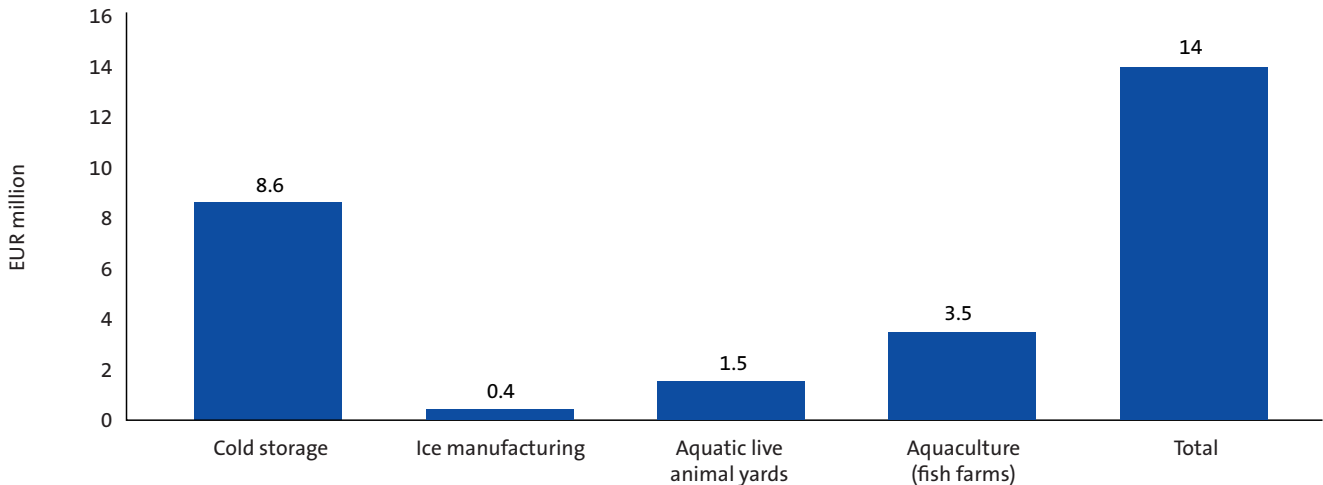


FIGURE 20. Estimated C&I solar market value for the fisheries sector (EUR million)**C&I solar market potential for the tourism sector**

With over 3,200 tourism facilities (e.g., restaurants and hotels), Mozambique's tourism sector is one of the best markets for C&I solar solutions in terms of the size of the potential customer base. The market sizing calculation may be slightly misleading, as it appears as if too many tourism facilities are on-grid to make the sector a viable C&I solar opportunity. However, the tourism sector in Mozambique is huge, and there is also a significant portion of tourism facilities that are off-grid. To give an idea of facility size and to depict a more realistic estimate of energy needs per category, these facilities were categorised based on the number of workers.

The estimated C&I solar market potential for the tourism sector is 62.9 MWp, for a total value of EUR 74M (Figures 21-23). However, about 97% of the estimated C&I tourism market potential covers grid-connected areas. Because C&I is less viable in on-grid areas – especially in southern provinces with more reliable EDM grid electricity (see Section 3.2) – the more interesting market opportunity is often in the off-grid sector.

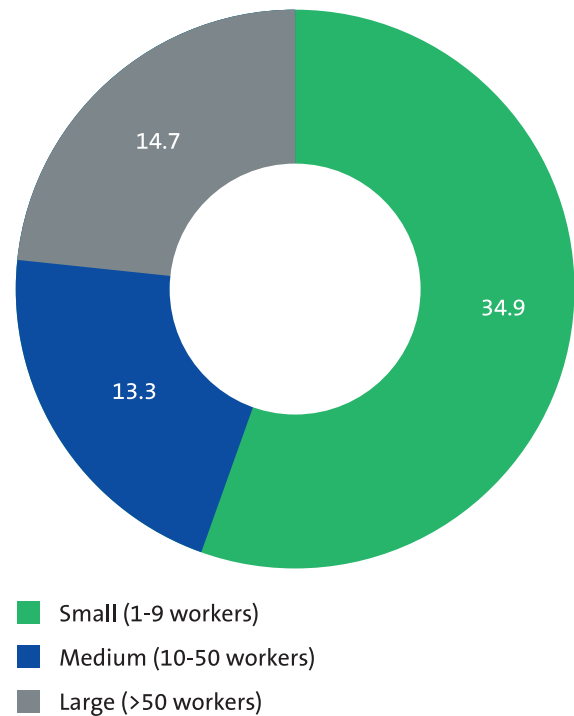
FIGURE 21. Estimated C&I solar market potential for the tourism sector (MWp)

FIGURE 22. Estimated C&I solar market potential for the tourism sector (number of customers)

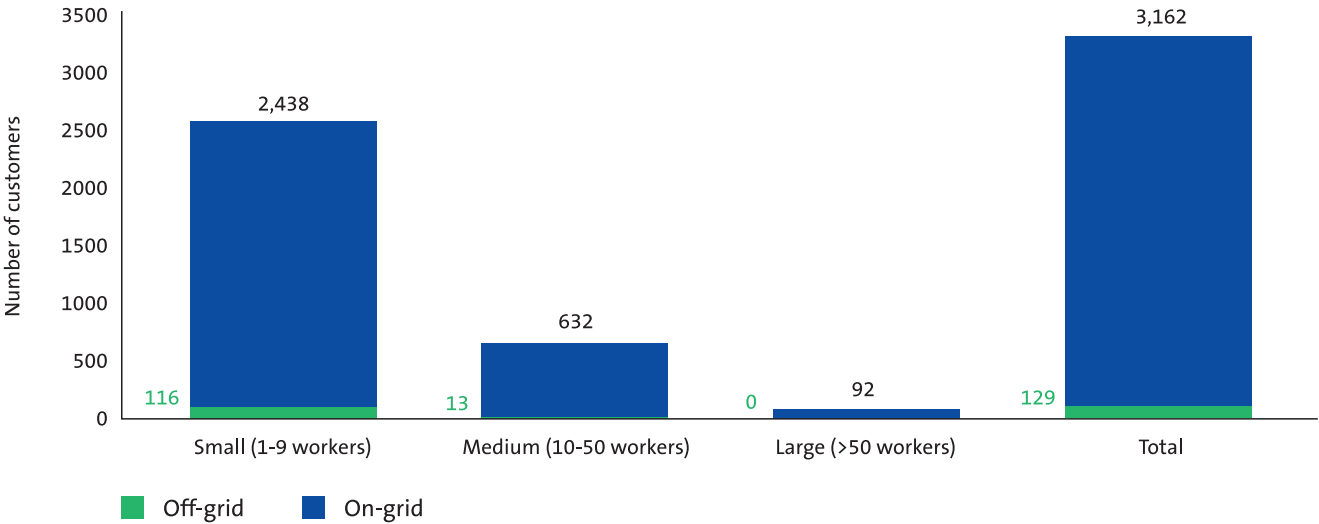
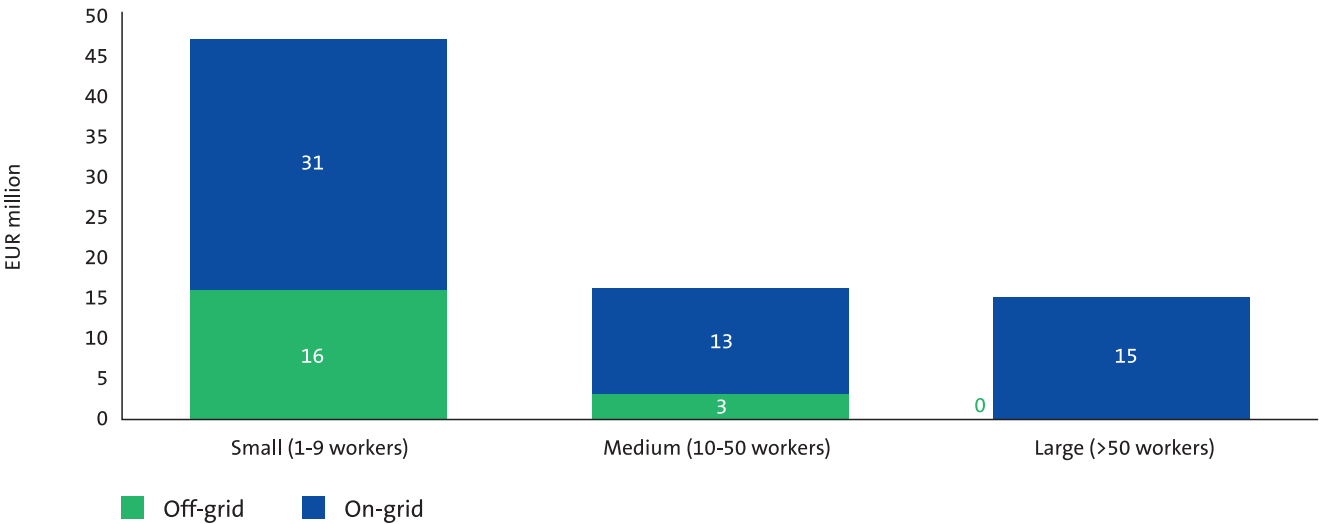
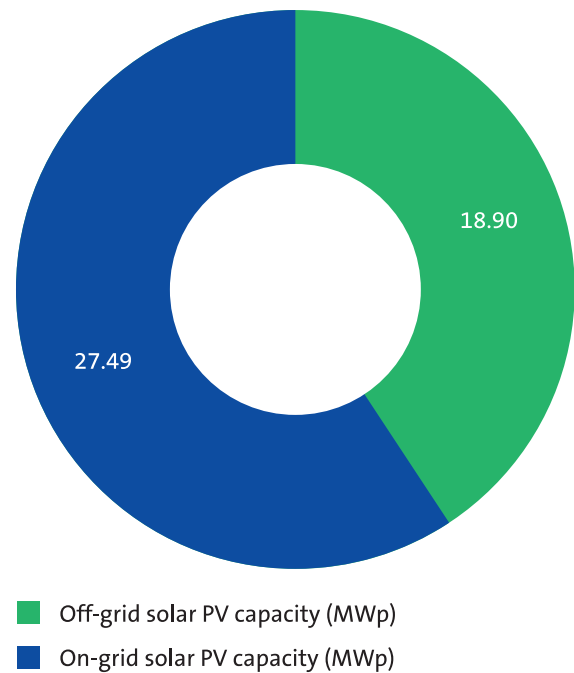
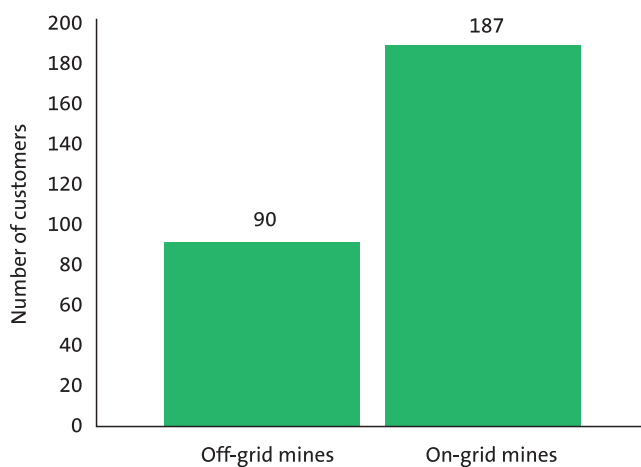
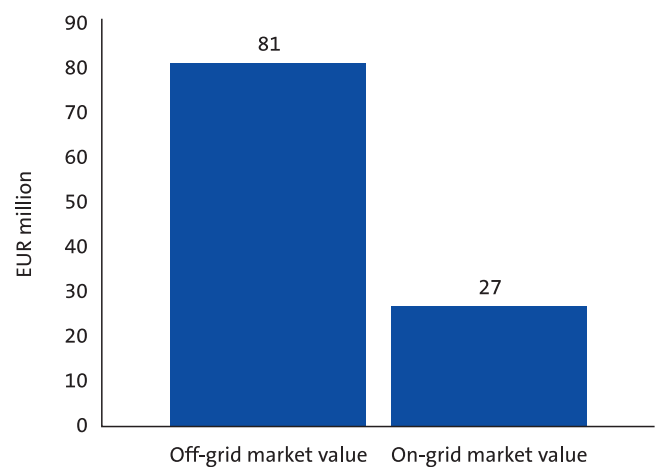


FIGURE 23. Estimated C&I solar market value for the tourism sector (EUR million)



C&I solar market potential for the mining sector

As described in [Section 3.3](#), Mozambique possesses abundant and diverse mineral resources. About 1,280 mining operations were identified in Mozambique, 425 of which are off-grid and 855 are on-grid. The market sizing calculation focuses on large facilities with valid mining concessions and certificates, which accounts for a total of 277 facilities, of which 90 are off-grid and running on diesel generators. The estimated C&I solar market potential for the mining sector is 46.4 MWp, for a total market value of EUR 108M ([Figure 24-26](#)).

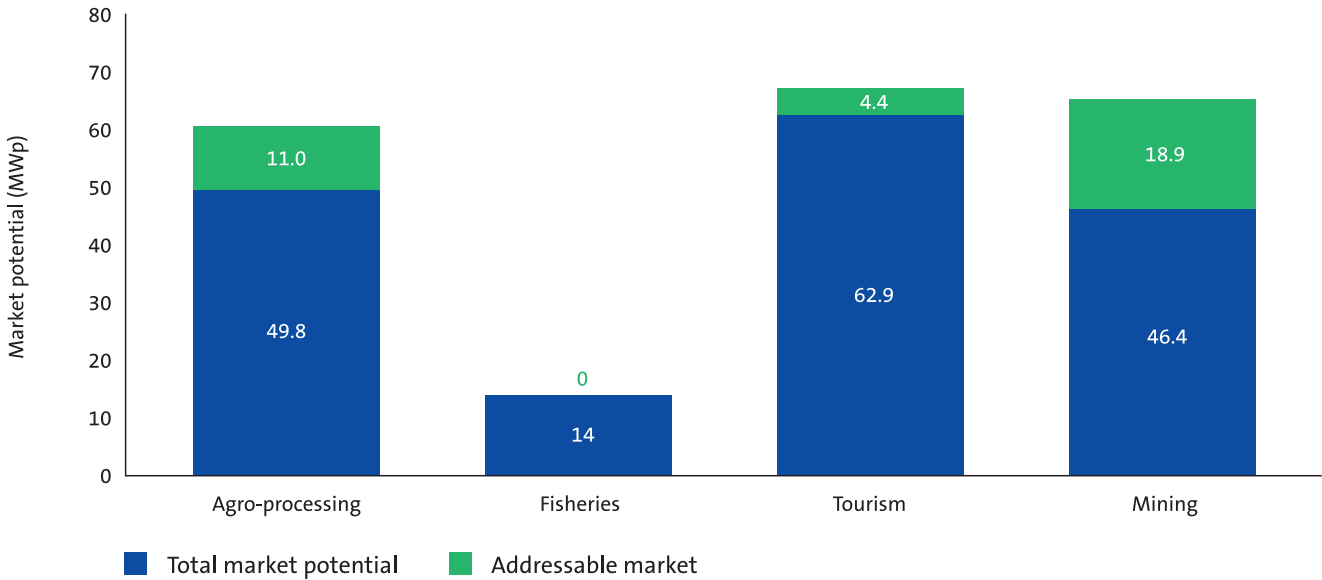
FIGURE 24. Estimated C&I solar market potential for the mining sector (MWp)**FIGURE 25.** Estimated C&I solar market potential for the mining sector (number of customers)**FIGURE 26.** Estimated C&I solar market value for the mining sector (EUR million)

Addressable market

Given the current market conditions for C&I solar in Mozambique – i.e., relatively cheap and reliable grid electricity – the C&I solar market with the most immediate opportunity is in the country’s off-grid areas. The total addressable off-grid C&I solar market has an estimated capacity of 34.3 MWp (Figure 27), representing about 17% of the total market potential, valued at approximately EUR 146M with about 280 potential customers (see Annex A for more details on the market sizing estimation).

The estimated total market potential is conservative because it does not cover all of the possible C&I sectors in the country; it only includes agricultural processing, fisheries, tourism and mining sectors. By switching from a diesel generator (the main source of electricity for most off-grid C&I facilities) to solar, these businesses can considerably reduce their operational costs and reduce their dependence on fossil fuels. The amount of savings will depend on the size of the solar system and the business model selected to acquire the solar system.

FIGURE 27. Estimated total C&I solar market potential for Mozambique (MWp)



4.2 LEGAL AND REGULATORY FRAMEWORK FOR C&I SOLAR IN MOZAMBIQUE

Mozambique has a codified legal system composed of normative acts, with two main regulatory bodies – the National Assembly and the Council of Ministers – which produce:

(i) legislative acts, being laws (approved by Parliament) and decrees of law (approved by the Government, with prior authorisation of Parliament); and (ii) regulatory acts, mainly decrees (approved by the Government).

Regulatory acts (especially decrees and decrees of law) refer mainly to laws approved by Parliament, national strategies, and policies, as well as the creation of regulatory authorities. The different ministries approve more specific guidelines and regulations in their respective sectors, which impact a wide range of regulatory authorities.

The legal framework for the electricity sector in Mozambique is extensive and considers both renewable and non-renewable energy. The main laws and regulations to consider when developing a C&I solar project are described below.

- Articles 14 and 15 of the new electricity law (12/2022) include provisions for “self-production” of electricity. If this power is supplied by a third-party to a C&I enterprise (for example at a given tariff), it is subject to a concession. If the C&I enterprise invests in the equipment and generates its own electricity, that installation is *not* subject to a concession. In both cases, the law opens the possibility to sell excess power to the grid (under terms to still be regulated).⁶⁴ It is important to note that C&I installations will require a licence for installation and exploration of electric power in which the terms are available in decree 60/2021.⁶⁵

- Two more legal instruments relevant to the C&I solar sector in Mozambique are Resolution No. 15/2020, of 14 April 2020, which approved the 2020-2024 Government Five-Year Programme, and Resolution No. 52/2021, of 21 October 2021, which approved the National Programme for Industrialisation of Mozambique (PRONAI). These resolutions cover a wide range of sectors – agriculture, fisheries, tourism and extractive industries – that are target consumers of C&I solar projects. PRONAI’s objectives are to increase national industrial production, promote the use of local raw materials, and drive commercialisation, rural transformation and job creation.
- In the 2016-2025 Industrial Strategy and Policy, the government promotes the industrial sector as the main vehicle for job creation and development of Mozambique’s abundant natural resources. This policy, which was approved in 2015, is re-enforced by the regional Southern African Development Community (SADC) Industrialisation Strategy and Roadmap, 2015-2063.

It is also important to examine regulations governing the electricity sector given its impact on the C&I solar sector. In fact, the availability, quality and cost of electricity has a considerable impact on the success or viability of any C&I solar business. **Table 10** summarises the applicable energy sector guidelines for grid-connected C&I solar projects.

Table 11 summarises the applicable energy sector guidelines for off-grid C&I solar projects.

64) Lei de electricidade 12/2022: <https://gazettes.africa/archive/mz/2022/mz-government-gazette-series-i-dated-2022-07-11-no-132.pdf>

65) <https://gazettes.africa/archive/mz/2021/mz-government-gazette-series-i-dated-2021-08-18-no-159.pdf>

TABLE 10. Energy regulations relevant to grid-connected C&I solar projects

INDICATOR	ELECTRICITY LAW REGULATIONS	PPP LAW AND REGULATIONS	APPLICABLE LICENCE APPROVALS	CONTRACTUAL ARRANGEMENTS	NEW DRAFT ELECTRICITY LAW
C&I supply to third parties	<ul style="list-style-type: none"> — No specific regime for C&I — General regime — Concession — Public tender 	<ul style="list-style-type: none"> — Concession — Public tender — IPP under a PPP regime 	<ul style="list-style-type: none"> — All general licences to register a business — Specific licences for IPP developers, namely establishment and operating/exploration licences 	<ul style="list-style-type: none"> — Concession contract — PPA — O&M — Financing arrangements — Letter of Credit — Guarantees 	<ul style="list-style-type: none"> — The holder of an electrical installation may, directly or through a third party, obtain the supply of electricity — The production facility for private use connected to the EDM national grid may enter into a sales contract with EDM for the sale of surplus electricity produced and not consumed, under terms to be regulated
C&I self-consumption	<ul style="list-style-type: none"> — Self-consumption does not entail supply to third parties 	N/A	<ul style="list-style-type: none"> — All general licences to register a business — Establishment and operating/exploration licences 	<ul style="list-style-type: none"> — No concession — Title of electrical installation belongs to the C&I owner — Lease and financing arrangement — O&M 	

TABLE 11. Energy regulations relevant to off-grid C&I solar projects

INDICATOR	ELECTRICITY LAW OFF-GRID REGULATIONS	PPP LAW AND REGULATIONS	APPLICABLE LICENCE APPROVALS	CONTRACTUAL ARRANGEMENTS	NEW DRAFT ELECTRICITY LAW
C&I supply to third parties	<ul style="list-style-type: none"> — Up to 10 MWp — Concession with a simplified regime 	N/A	<ul style="list-style-type: none"> — All general licences to register a business — Establishment and operating/exploration licences, depending on the size of the installation 	<ul style="list-style-type: none"> — Concession contract — Title of electrical installation belongs to the project developer during the concession period 	<ul style="list-style-type: none"> — Concession and interconnection rules are regulated — Exemption from concession fees
C&I self-consumption	<ul style="list-style-type: none"> — Not regulated 	N/A	<ul style="list-style-type: none"> — All general licences to register a business — Establishment and operating/exploration licences 		<ul style="list-style-type: none"> — The holder of an electrical installation may, directly or through a third party, obtain the supply of electricity — The production facility for private use connected to the EDM grid may enter into a sales contract with EDM for the sale of surplus electricity produced and not consumed, under terms to be regulated

The regulation around import duties on solar equipment is also critical to C&I market development given the cost implications and the fact that most solar equipment is not produced locally. Import of equipment may follow two possible channels in Mozambique. If a C&I company is importing for commercialisation of the equipment, there is a 17% VAT that needs to be paid and 7.5% in duties. If, instead, a C&I client imports the equipment themselves as part of their investment, this equipment is categorised under class K and is exempt from import taxes.

The import and export of goods are subject to control by Customs and must be carried through the ports, airports and other customs offices duly authorised for the purpose. An import licence is obtained via the Ministry of Industry and Commerce. The following supporting documents are required:

- Form fulfilled and signed;
- Updated Commercial certificate;
- Sole Taxpayer Number (NUIT);
- Identification document of the legal representative of the Company;
- Resolution or Power of attorney appointing the legal representative of the Company;
- Articles of Associations published in the official gazette;
- Lease agreement of the company's office; and
- Drawings and Layout of the company's office.

4.3 REGISTERING A BUSINESS IN MOZAMBIQUE

In 2020, Mozambique ranked 176th out of 190 countries in the World Bank's 'Doing Business' index for starting a new business.⁶⁶ This relatively poor ranking is justified by an overall lack of automation in the business registration process. The process to register a company in the country can take up to 90 days. All provinces have implemented "one-stop-shop" windows (Balcão

de Atendimento Único, BAÚ). Nevertheless, they are not all equipped with representatives from the institutions required to complete the registration process.

There are no local rules in place requiring companies to reserve a certain percentage of their shareholdings for local partners. However, certain regulations may set out specific rules on share ownership in connection with specific business sectors. In the energy sector, the application of the Electricity Law and the Public Private Partnership (PPP) Law triggers the requirement of state participation in all projects developed under a PPP.

Figure 28 provides an overview of the procedures to register a business in Mozambique.

There are no restrictions regarding directors' nationality or residency. Any person can be appointed director, whether or not he or she is a member of the company.

The development of power projects in Mozambique is regulated under the Electricity Law and the PPP Law, and, as such, the type of companies to develop such projects must be incorporated in the form of a limited company by shares (SA). The Mozambican Commercial Code (Código Comercial Moçambicano, CCM), approved by Decree-Law No. 2/2005, as amended, defines the legal regime applicable to the exercise of commercial activities in Mozambique.

There are two main types of limited liability companies in Mozambique:

- 1) Limited liability company by shares – *Sociedade Anónima* ("SA")
- 2) Limited liability company by quotas – *Sociedade por Quotas* ("Lda")

There is no statutory minimum share capital needed to incorporate a company. However, the share capital of the company must be in an amount appropriate to the business that it plans to conduct. A minimum of three (3) shareholders is required to incorporate an SA company, whereas Lda companies require a minimum of only two (2) quota-holders. It is worth noting

66) World Bank Ease of Doing Business in Mozambique, 2020: <https://archive.doingbusiness.org/en/data/exploreconomies/mozambique>

FIGURE 28. Overview of procedures to register a company in Mozambique⁶⁷



COMPANY NAME RESERVATION – 1 DAY

A name reservation certificate is valid after which the certificate can be renewed and it costs approximately MZN 300, roughly USD 4.5.

APPROVAL OF INCORPORATION OF THE COMPANY – 1 TO 3 DAYS

The cost of incorporation of a company is contingent upon the amount of its capital share.

PUBLICATION OF THE COMPANY'S ARTICLES OF ASSOCIATION – 15 TO 30 DAYS

The fee is in accordance with the number of pages and number of lines of the physical copy of the articles of association.

TAX PAYER REGISTRATION – 2 TO 3 DAYS

No cost. It is mandatory that the company is registered at the tax authority.

that the CCM prescribes that Lda companies can have up to 30 quota-holders, but there is no limitation as to the maximum number of shareholders for SA companies.

Annex B provides a list of legislation governing the registration of a business in Mozambique. **Annex C** provides additional key licences and registration procedures for the following:

- Process for registration to be able to repatriate funds;
- Environmental licences needed; and
- Labour conditions.

4.4 C&I SOLAR FINANCING IN MOZAMBIQUE

An assessment of local banks in Mozambique found that there are no specific credit lines tailored to the C&I solar sector in the country. Financing is therefore subject to commercial debt-based financing indexed at the prime interest rate and offered according to the specific conditions dictated by various commercial banks operating in the country. Between 2001 and 2021, the average lending rate in Mozambique was 19.56%, reaching an all-time high of 29.75% in October 2002 and a record low of 14.23% in September 2015.⁶⁸ **Table 12** lists banks that offer credit to both individual consumers and companies in Mozambique.

67) See **Annex B** for more details on the number of days needed to go through the entire process.

68) Mozambique Prime Lending Rate: <https://tradingeconomics.com/mozambique/lending-rate>

TABLE 12. Financial institutions active in Mozambique

FINANCIAL INSTITUTION	WEBSITE
ABSA	www.absa.co.mz
Access Bank	www.mozambique.accessbankplc.com
Banco Commercial de Investimaentos (BCI)	www.bci.co.mz
Banco de Investimento Global (BiG)	bancobig.co.mz
Banco Nacional de Investimentos (BNI)	www.bni.co.mz
Ecobank	www.ecobank.com/mz/
First Capital Bank	firstcapitalbank.co.mz
First National Bank (FNB)	www.fnb.co.mz
Millennium BIM	millenniumbim.co.mz
Moza Banco	www.mozabanco.co.mz
Nedbank	online.nedbank.co.mz
Société Générale	societegenerale.co.mz
Standard Bank	www.standardbank.co.mz
United Bank of Africa	www.ubamozambique.com

Local bank interest rates are considered high for those seeking loans for renewable energy projects. As such, the following financing strategies are recommended:

- Training and coaching: Most local African banks are not well versed in project financing, instead preferring short-term loans based on inventory or other forms of collateral. Technical assistance programmes targeting financial institutions—such as the programme implemented by GET.invest—aim to help bankers better understand the renewable energy project cycle and associated due diligence

procedures in order to develop financial products with appropriate terms (e.g., interest rates and tenor).

- Cash-deposit guarantees: Cash-deposit guarantees – such as the Green-for-Access First Loss Facility (G4A) developed by GreenMax Capital Group – place a percentage (e.g., 20%) of a bank's renewable energy loan portfolio into a bank savings account. In the case of delinquent borrowers, the bank can service the outstanding loan(s) with resources in the cash-deposit guarantee account. If there are no delinquencies, the account earns interest.⁶⁹

69) Green-for-Access First Loss Facility: <https://greenmaxcap.com/service/green-for-access-first-loss-facility-g4a/>

- Balancing foreign currency and local currency borrowing: Renewable energy project developers should limit local currency borrowing so as to cover local currency OPEX and CAPEX only for locally available capital equipment. For CAPEX that must be imported, the borrower should seek out more affordable foreign currency debt.

Financial incentives promoted by donors and DFIs for specific priority sectors may be applicable for small-scale C&I projects. Sectors such as agriculture, tourism and fisheries have dedicated low-interest credit lines for financing business development activities. For example, the ABSA and US International Development Finance Corporation Agribusiness Line of Credit offers lower interest loans (2% below the prime lending rate) for up to USD 3.3M for capital expenditure (including equipment). If the energy generation equipment is considered necessary for the project, they could in turn be financed under the credit line. Similarly, BCI provides the SUPER credit line supported by UNIDO and financed by the Global Environment Facility. Although this credit line specifically targets productive uses of energy (PUE), it could be considered for certain C&I applications.

International financing

Commercial and industrial users may also opt for international financing as part of a direct foreign investment into the project. Loans from international institutions may be acquired but need to be registered with the Bank of Mozambique to allow for repayment. For this option, there is a (20%) withholding tax on the interest that needs to be paid to the central bank.

For developers, international financing that may cover inventory costs is a strategy commonly used to mitigate exposure to high local interest rates. The developer in turn can finance the solar installation and offer the same on a lease, PPA or as an ESCO (see [Section 2.4](#)). The EU Electrification Financing Initiative (EDFI ElectriFI) provides blended financing (debt and equity) between EUR 500k and EUR 10M for businesses in their initial growth phase. Commercial and industrial solar is one of the business models that this facility supports in priority countries such as Mozambique (with EUR 15 M available in the country window.⁷⁰

Technical assistance

Technical assistance is another form of indirect financing which is available to C&I solar companies as well as developers in their start-up stage. For C&I companies, GET.invest provides TA for project development through the preparation of a technical pre-feasibility study and economic analysis. This analysis may in turn be for procurement purposes or to help determine whether or not the enterprise should invest in self-generation.

Early-stage C&I companies can receive support in accounting, financial modelling and business planning through the GET.invest Finance Readiness Support (FRS) activity.⁷¹ More well-established companies receive assistance with raising capital through the GET.invest Finance Catalyst programme.⁷²

4.5 C&I SOLAR CONSUMER AWARENESS IN MOZAMBIQUE

Current status of awareness

There is a relatively high level of awareness of solar for C&I applications in Mozambique; however, there is generally limited understanding of technology options, business models and the economics of these projects. There are varying levels of awareness depending on the stakeholders involved (i.e., C&I beneficiaries, renewable energy companies and financial institutions).

There is currently no legislation that specifically governs C&I solar project development in Mozambique. This is largely due to the premise that electrification is reliant on grid power and diesel/petrol generator backup. Discussions with policymakers have, however, made it evident that there is a willingness to develop sector-specific regulations and to foster an enabling environment for investment in the sector.

There are no credit lines for C&I solar investments provided by local banks. This is largely due to limited information about the investment potential and business models applicable to the sector.

70) ElectriFI: <https://www.electrifi.eu/>

71) GET.invest Finance Readiness Support: <https://www.get-invest.eu/about/who-we-are/get-invest-finance-readiness-support/>

72) GET.invest Finance Catalyst: <https://www.get-invest.eu/finance-catalyst/>

Although most stakeholders in Mozambique have an informed understanding about renewable energy, they have comparatively limited understanding of C&I applications. This can largely be attributed to the country's relatively stable grid power supply in most urban centres, as well as relatively affordable electricity tariffs. Companies operating in off-grid locations or areas with unstable grid electricity are generally more aware of C&I solar technology and are interested in investing in these solutions, especially in cases where they are still heavily reliant on diesel generators. As Mozambique promotes environmental sustainability as part of its sustainable development objectives, there is greater interest in renewable energy investments, especially in solar.

Improving awareness

Raising awareness is critical for the growth and development of the C&I solar sector in Mozambique. This is particularly true for C&I solar applications located in off-grid areas, where switching from the use of diesel generators to solar energy can considerably reduce the operational costs of the business. Awareness can be raised through consumer education campaigns and pilot project showcases at the national and provincial level.

The government, through MIREME and FUNAE, has promoted solar energy to improve rates of electricity access in rural areas, contributing significantly to improving awareness of the technology's advantages. However, to facilitate funding into the sector, specific efforts need to be made to improve awareness among C&I beneficiaries and among financial institutions.

Awareness campaigns can be costly but are crucial to unlocking the market, especially when there are key changes needed in the sector's enabling environment. Given the current context of the C&I solar market, it is important to communicate these opportunities, particularly to businesses in off-grid areas. An awareness campaign should include marketing, communications and outreach activities, utilising a mix of media, including TV, radio, print media, SMS and social media. The campaign must be appropriate to the social, cultural and demographic characteristics of the different provinces and C&I businesses that are being engaged.

There is already a well organised solar industry in Mozambique that can be utilised to raise awareness. Two industry associations – Associação Industrial de Moçambique (AIMO) and Associação Moçambicana de Energias Renováveis (AMER) – have existing networks that can be used to inform stakeholders about the opportunities inherent in C&I solar. This outcome could be

achieved by sharing the results of this study or other similar studies conducted in Mozambique (e.g., through mailing lists or through workshop events).

4.6 C&I SOLAR MARKET OUTLOOK

The C&I solar market is promising in Mozambique, with a significant estimated total market potential of 173 MWp (based on methodology presented in [Annex A](#)). However, without a supportive enabling environment, this market potential will not be fully realised and will largely be confined to the addressable C&I solar market (i.e., off-grid businesses that are using diesel generators to produce electricity to power their equipment/operations). Given the country's reliable supply and low cost of electricity (at EUR 0.07/kWh for medium voltage consumers purchasing from the utility), the market potential for C&I solar located in grid-connected areas is less financially attractive, at least in the near future.

Off-grid C&I solar represents an estimated total addressable market of 34.3 MWp, or about 17% of the total market size, valued at approximately EUR 140M, with about 280 potential customers (see [Annex A](#)). Despite the important economic advantages for C&I solar, limited access to financing will considerably restrict the number of C&I projects that can be realised.

The currently estimated addressable market is not expected to increase over time if the current enabling environment does not change and if incentives are not introduced. On the contrary, it is expected to reduce in size as the GoM improves grid electricity access and reliability. The locations with high C&I potential are mainly a priority for grid extensions and mini-grids. Thus, by 2030, if GoM ambitions on electricity access are realised and grid quality is maintained, there will only be a limited addressable market for the C&I solar sector. If the opposite materialises, and the power sector fails to develop as envisioned, C&I solar can save businesses significant operating expenses in the interim.

The future market potential for C&I solar in Mozambique may depend on the scope of grid-connected areas. However, this market will only be attractive if one or more changes to the enabling environment, namely:

- An increase in the national electricity tariff to be equal or above the cost of solar-generated electricity. According to GoM representatives, the government is planning to increase the national grid electricity tariff over the next five

years. Depending upon the increase, it may unlock the C&I solar on-grid market;

- Introduction of a feed-in-tariff to allow excess energy produced from solar system to be sold to the utility;
- Tax incentives to reduce the cost of solar energy systems and components;
- Improved access to low-cost financing, to reduce the overall cost of solar energy and increase the number of viable business models; and
- Degradation of the (currently adequate) quality of the electricity from the national grid.

There are several solar companies active in Mozambique, but given the current environment, none of them are exclusively focused on the C&I solar sector. Some have already installed solar solutions for off-grid C&I, but it is generally not the focus of their business. Many companies prefer to focus on other solar market segments, such as stand-alone systems (SHS) for households, public institutions and productive use or even solar mini-grids, which are sectors currently being promoted by the government and several donors to improve electricity access.

This Developer Guide is complemented by two model business cases that analyse the financial feasibility of two hypothetical C&I projects: (1) an on-grid C&I solar lease-to-own project; and (2) a 32kWp off-grid C&I solar project.

ANNEX A

Market Sizing Methodology

This annex presents the methodology and assumptions used to estimate the C&I solar market size for each of the selected sectors in [Section 4.1](#). The general steps taken are outlined in [Figure A1](#).

Steps 1 and 2

Only the C&I sectors with the highest demand for electricity were considered in the analysis; these sectors include agricultural processing, fisheries, tourism and mining (see [Section 3.3](#)).

Step 3

For each selected sector, the estimated number of facilities in the country was identified. Where possible, information was obtained on the number of facilities with access to the national grid and those without access/in off-grid areas. The number of facilities represents the total number of potential customers.

Step 4

This step was challenging, as information on the daily energy needs for each type of facility was unavailable. Interviews were conducted with several C&I enterprises to collect information on their monthly energy consumption. It was assumed that C&I enterprises with similar activities would have the same energy needs.

Step 5

The sizing of the solar system was calculated based on the results of Step 4, using the technical assumptions in [Table A1](#).

FIGURE A1. C&I solar market sizing methodology

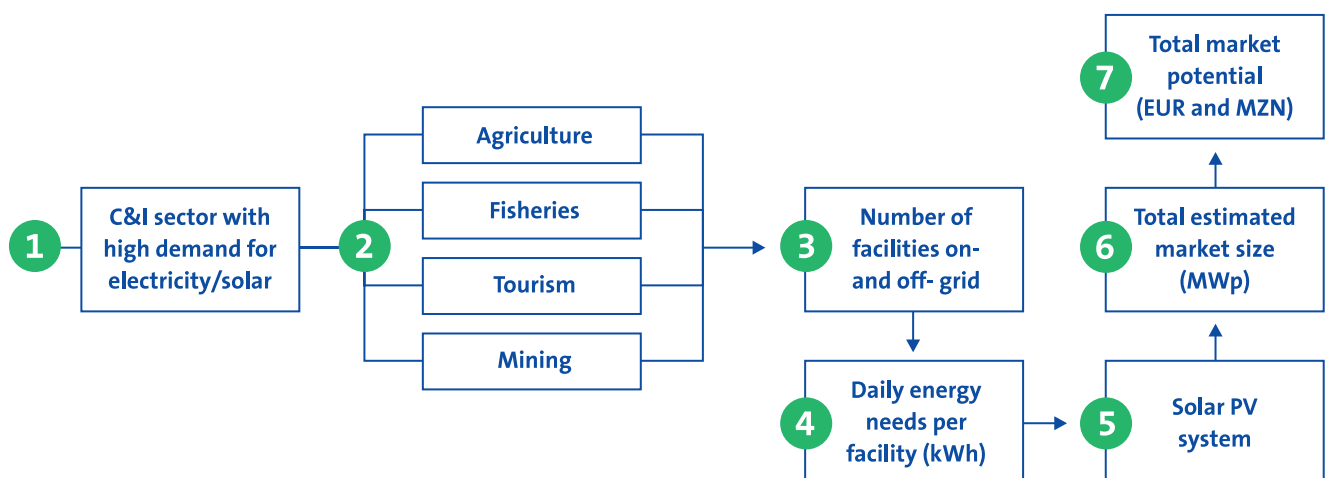


TABLE A1. Solar PV system technical assumptions

SOLAR PV SYSTEM PARAMETERS	UNIT	VALUE (OFF-GRID)	VALUE (ON-GRID)
Solar irradiation (min monthly average – Beira ⁷³ ; August)	kWh/m ² day		5.4
Base Annual Yield	kWh/kWp	1,975	1,975
Customer's annual electricity needs supplied by solar system	%	16.3%	16.3%
Battery capacity – number of days of autonomy	days	3	N/A
Portion of PV generation replacing grid electricity (on-grid) and genset (off-grid)	%	100%	70% except for tourism where 40% is considered

Step 6

The total market size (MWp) is the sum of the PV capacity estimated for each facility (off-grid + on-grid).

Step 7

The total market potential (EUR million) is the sum of the total market size for off-grid facilities (MWp) times the average cost of a solar PV system with storage in Mozambique (EUR/MWp or EUR/kWp) plus the total market size for on-grid facilities (MWp or kWp), times the average cost of a solar PV system without storage in Mozambique (EUR/MWp or EUR/kWp).

AGRICULTURAL BUSINESS SECTOR MARKET SIZING

Assumption 1

According to National Institute of Statistics (INE), in 2020, there were approximately 15 agricultural processing plants operating in off-grid areas of the country and 377 plants operating with access to grid power.⁷⁴ Ten (10) processing plants in off-grid areas and 193 in on-grid areas are medium- or large-scale plants. In the analysis, only medium- and large-scale facilities represent potential C&I solar businesses; the market sizing estimation is therefore only based on the medium- and large-scale processing plants.

Assumption 2

In reality, not all facilities have the same electricity needs for processing their products (even if they process the same products), as certain processes will require more energy. The facilities considered in the analysis have the highest electrical needs (in kWh per month) for processing their products. Unfortunately, no recent data was available by type of agro-processing industry. Based on consultations with AIMO (Associação Industrial de Moçambique), the following three types of agro-processing businesses were identified as having the highest electricity need: Cereal Milling (Moageira), Cashew (Cajú) and Oil (Oleos). Bakery (Panificação) was not considered because their main source of energy is gas, and they have little demand for electricity compared to other industries. Other industries (Outras) were also not considered, as it was not possible to estimate their energy needs.

Assumption 3

As indicated in [Section 3.3](#), most agro-processing facilities located in off-grid areas are in Tete and Zambezia Provinces. It is therefore assumed that the processing facilities in these provinces are all off-grid. Thus, the analysis considered 3 Cereal, 1 Caju, and 4 Oil processing facilities in off-grid areas.

Assumption 4

Information on the daily energy needs of each facility was not available. Interviews were conducted with one agro-processing facility for each of the three types of facilities to obtain monthly energy consumption needs for each, as shown in [Table A2](#).

⁷³) Selected for its location near the centre of the country and the availability of the data.

⁷⁴) Dataset from Mozambique National Institute for Statistics - INE (2020).

TABLE A2. Energy needs for agricultural processing facilities

TYPE OF PROCESSING FACILITY	INDUSTRY NAME	AVERAGE MONTHLY ENERGY CONSUMPTION FOR ONE FACILITY (KWH/MONTH)
Cereal Milling (Moageira)	Limpopo Industriais Alimentares	24,150
Cashew (Cajú)	Condor Anacardium	50,400
Oil (Oleos)	Fabrica Southern Refineries	182,712

It was assumed that the electricity needed for similar facilities is equal to the facilities in [Table A2](#). It was also assumed that facilities do not operate on Sundays.

Market potential: Number of customers

The total number of potential C&I customers for the agro-processing sector is 66, including the eight (8) located off-grid (representing the addressable customers). The total number of potential customers is a conservative estimate, since only three types of agro-processing facilities were considered. Furthermore, this is based on data from 2013, where there was a total of 177 agro-processing facilities, whereas the National Institute of Statistics in 2020 indicates that a total of 377 facilities exist (an additional 200 facilities). Given the current economic growth of the sector, the number of agro-processing facilities is expected to continue to increase over the next few years.

Market potential: MWp

Based on the monthly energy consumption of each type of processing facility, the energy capacity (in MW) was estimated based on the following steps:

- 1) Calculate the daily energy consumption from the monthly known consumption; divide the monthly energy by 26, assuming that the facilities do not operate on Sundays.
- 2) Calculate the solar PV consumption based on daily energy needs, the solar irradiation in Mozambique and three days storage capacity (for off-grid systems only).
- 3) The total capacity for an on-grid PV system is assumed to be 70% of the total capacity.

The results are presented in [Table A3](#).

TABLE A3. Agricultural processing market sizing calculations (MWp)

TYPE OF PROCESSING FACILITY	NO. OF POTENTIAL CUSTOMERS OFF-GRID	NO. OF POTENTIAL CUSTOMERS ON-GRID	TOTAL NO. OF POTENTIAL CUSTOMERS	PV CAPACITY OFF-GRID (MWp)	PV CAPACITY ON-GRID (MWp)	TOTAL MARKET CAPACITY (MWp)
Cereal (milling)	3	24	27	0.9	5.3	6.2
Cashew	1	19	20	0.7	8.6	9.3
Oil	4	15	19	9.4	24.8	34.2
TOTAL	8	58	66	11.0	38.7	49.7

Market value: EUR

The total market potential value in EUR is calculated by multiplying the cost of a solar system without storage (1 EUR/W) by the estimated potential on-grid PV capacity in MWp and the cost of a solar system with storage (4.27 EUR/W) by the estimated potential off-grid PV capacity in MWp (Table A4).

TABLE A4. Agricultural processing market sizing calculations (EUR million)

TYPE OF PROCESSING FACILITY	MARKET VALUE FOR OFF-GRID (EUR MILLION)	MARKET VALUE FOR ON-GRID (EUR MILLION)	TOTAL MARKET VALUE (EUR MILLION)
Cereal (milling)	4.0	5.3	9.3
Cashew	2.8	8.6	11.4
Oil	40.3	24.8	65.1
TOTAL	47.1	38.7	85.8

FISHERIES SECTOR MARKET SIZING

Assumption 1

There are a total of 36 licensed processing/conservation fishery centres in Mozambique (Table A5).⁷⁵ Cleaning and packing centres were not considered in the analysis because they are mostly artisanal centres and have limited electricity needs.

Assumption 2

Most fishery facilities are located in coastal areas where the grid is largely available (see Figure 12). It was therefore assumed that all 36 licensed facilities are connected to the grid.

Assumption 3

Information on the daily energy needs of each facility was not available. One facility was interviewed for each of the four types of facilities selected to obtain the monthly energy consumption for each as shown in Table A6.

It is assumed that the electricity needs for similar types of facilities are equivalent. For ice manufacturing and aquatic live animal yards, information was used from benchmarks of similar facilities obtained through desk research.

TABLE A5. Number of fisheries processing centres

TYPE OF PROCESSING FACILITY	QUANTITY
Cold stores	15
Ice manufacturing	4
Aquatic live animal yards	15
Aquaculture farm	2
Total	36

75) Balanço do Plano Económico e Social de Janeiro-Dezembro de 2019.

TABLE A6. Energy consumption of fisheries processing centres

TYPE OF PROCESSING FACILITY	COMPANY	AVERAGE MONTHLY ENERGY CONSUMPTION FOR ONE FACILITY (KWH/MONTH)
Cold stores	Indimar SA	85,000
Ice manufacturing		
Aquatic live animal yards		
Aquaculture farm	Aqua Pesca Lda	261,267

Market potential: Number of customers

As shown in [Table A7](#), the total number of potential customers is 36 – all of which are assumed to be connected to the national grid. Since there is no facility located off-grid, there are no immediate addressable customers for this sector.

TABLE A7. Solar customers for fisheries processing centres

TYPE OF PROCESSING FACILITY	QUANTITY	UNIT SOLAR CAPACITY (KWP)	TOTAL SOLAR CAPACITY (KWP)
Cold storage	15	40	600
Ice manufacturing	4	20	80
Aquatic live animal yards	15	50	750
Aquaculture farm	2	100	200
TOTAL	36		1,630

Market potential: MWp

Based on the monthly energy consumption of each type of processing facility, the energy capacity (in MWp) was estimated based on the following steps:

- 1) Calculate the daily energy consumption from the monthly known consumption; the daytime energy consumption is considered to be 50% of the daily energy need.
- 2) Calculate the PV consumption based on 50% of the daily energy need, the solar irradiation in Mozambique and three days storage capacity (for off-grid systems only).

The results are presented in [Table A8](#).

TABLE A8. Solar requirements of fisheries processing centres

TYPE OF PROCESSING FACILITY	NO. OF POTENTIAL CUSTOMERS OFF-GRID	TOTAL NO. OF POTENTIAL CUSTOMERS	PV CAPACITY OFF-GRID (MWP)	PV CAPACITY ON-GRID (MWP)	TOTAL MARKET CAPACITY (MWP)
Cold storage	0	15	0	8.6	8.6
Ice manufacturing	0	4	0	0.4	0.4
Aquatic live animal yards	0	15	0	1.5	1.5
Aquaculture farm	0	2	0	3.5	
TOTAL	0	36	0	14.0	10.5

Given that all facilities have access to the grid, the addressable customer market is non-existent for this sector (and given the current enabling environment for grid-connected projects). However, if the situation were to change (e.g., through an increase of the electricity tariff, deterioration of the quality of the electricity and/or the introduction of a feed-in tariff by the government as an incentive), the total market of 14 MWp would become addressable. Additionally, if the reliability of the grid was to deteriorate, the on-grid market could also become addressable.

Market value: EUR

The potential market value in EUR is calculated by multiplying the cost of a solar system without storage in Mozambique (1 EUR/W) by the estimated potential in MWp (Table A9).

TABLE A9. Fisheries market sizing calculations (EUR million)

TYPE OF PROCESSING FACILITY	MARKET VALUE FOR OFF-GRID (EUR MILLION)	MARKET VALUE FOR ON-GRID (EUR MILLION)	TOTAL MARKET VALUE (EUR MILLION)
Cold stores	0	8.6	8.6
Ice manufacturing	0	0.4	0.4
Aquatic live animals	0	1.5	1.5
Aquaculture farm	0	3.5	3.5
TOTAL	0	14	14

TOURISM SECTOR MARKET SIZING

Assumption 1

There are a total of 3,162 facilities powered by the national grid and 129 located off-grid, as indicated in [Section 3.3](#). The facilities are either restaurants or hotels (no more details about the facilities were available). The number of workers per facility was used to estimate the size of the facility and separate the facility into three size categories, as shown in [Table A10](#).

Assumption 2

It is assumed that all facilities can be considered potential C&I solar users. Although the capacity of solar PV systems for small facilities is generally smaller than the classic size of C&I solar systems, all of the facilities were considered given the large number of facilities found under this category.

Assumption 3

Much like other sectors, information on the daily energy needs from each facility was not available. Interviews were conducted with one facility for each of the four types of facilities selected to obtain the solar capacity needed to satisfy the energy needed for facilities in each of the three categories.

It is assumed that the solar PV capacity needs for similar types of facilities are equivalent. Since the solar capacity estimated for different categories was based on off-grid facilities, it is assumed that for on-grid facilities, the solar capacity corresponds to 40% of the off-grid solar capacity.

TABLE A10. Number of tourist hotels by size

TYPE OF FACILITY	NUMBER OF OFF-GRID FACILITIES	NUMBER OF ON-GRID FACILITIES
Small (1-9 Workers)	116	2,438
Medium (10-50 Workers)	13	632
Large (>50 Workers)	0	92
TOTAL	129	3,162

TABLE A11. Tourism hotels by size of solar system

TYPE/SIZE OF FACILITY	SOLAR PV CAPACITY (IN KWP)	FACILITY
Small (1-9 Workers)	25	Eco-tourism lodge
Medium (10-50 Workers)	50	The Safari camp
Large (>50 Workers)	400	Azura Mozambique

Market potential: Number of customers

As shown in [Table A10](#), the total number of potential customers is 3,291, of which 129 are off-grid and represent the addressable market.

Market potential: MWp

The total solar potential for the tourism sector was calculated by multiplying the solar capacity estimated for the three facility-types analysed by their respective quantities across the country. [Table A12](#) summarises the results of the potential for C&I solar in the tourism sector.

TABLE A12. Tourism sector market sizing calculations (MWp)

TYPE/SIZE OF FACILITY	NO. OF FACILITIES OFF-GRID	NO. OF FACILITIES ON-GRID	PV CAPACITY OFF-GRID (MWp)	PV CAPACITY ON-GRID (MWp)	TOTAL MARKET CAPACITY (MWp)
Small (1-9 Workers)	116	2,438	3.71	31.21	34.9
Medium (10-50 Workers)	13	632	0.65	12.64	13.3
Large (>50 Workers)	0	92	0	14.72	14.7
TOTAL	129	3,162	4.36	58.6	62.9

The immediate addressable market includes facilities located off-grid, which has an estimated potential of 4.4 MWp.

For large facilities, given that all of the facilities are located in urban areas where there may be limited space available to install solar panels, it was assumed that large facilities with access to the grid have a potential for 160 kWp of solar capacity, which means these facilities will have a surface area available for the installation of solar panels of around 1,500m² depending on the configuration selected.

Market value: EUR

The market value was estimated based on the cost of solar PV per watt peak in Mozambique, including storage for off-grid facilities at EUR 4.27/Wp and without storage for on-grid facilities at EUR 1/Wp. The results are presented in [Table A13](#).

TABLE A13. Tourism sector market sizing calculations (EUR million)

TYPE/SIZE OF FACILITY	MARKET VALUE FOR OFF-GRID (EUR MILLION)	MARKET VALUE FOR ON-GRID (EUR MILLION)	TOTAL MARKET VALUE (EUR MILLION)
Small (1-9 Workers)	16	31	47
Medium (10-50 Workers)	3	13	15
Large (>50 Workers)	0	15	15
TOTAL	19	59	77

MINING SECTOR MARKET SIZING

Assumption 1

As indicated in [Section 3.2.4](#), there are a total of 455 off-grid mining facilities and 855 on-grid facilities in Mozambique. The analysis only considered mining facilities with valid mining concessions and certificates, which account for a total of 277 facilities, of which 90 are off-grid and running on diesel generators.

Assumption 2

Data on energy consumption/needs was not available. An interview was conducted with an off-grid mine and processing centre for precious and semi-precious minerals and gems that uses a diesel generator for electricity generation. Based on the known monthly diesel consumption, the monthly energy consumption was estimated at 14,062 kWh, which was used to calculate the solar capacity needed at 210 kWp. It is assumed that all the large-scale commercial mines have the same energy needs.

Market potential: Number of customers

Based on *Assumption 2*, the total number of potential customers for the mining sector is 277, of which 90 are assumed to be off-grid and represent the addressable potential customers given the current regulations and policy environment.

Market potential: MWp

The total solar potential for the mining sector was calculated by multiplying the number of facilities by the energy consumption of each facility (off-grid and on-grid). [Table A14](#) summarises the results of the potential for C&I solar in the mining sector.

TABLE A14. Mining sector market sizing calculations (MWp)

TYPE OF FACILITY	NO. OF FACILITIES OFF-GRID	NO. OF FACILITIES ON-GRID	PV CAPACITY OFF-GRID (MWp)	PV CAPACITY ON-GRID (MWp)	TOTAL MARKET CAPACITY (MWp)
Large-scale mine	90	187	18.9	27.5	46.4
TOTAL	90	187	18.9	27.5	46.4

The immediate addressable market includes facilities located off-grid, with an estimated potential of 18.9 MWp, while the overall market size is estimated at 46.4 MWp.

Market value: EUR

The market value is estimated based on the cost of solar PV per watt-peak in Mozambique, including storage for off-grid facilities at EUR 4.27/Wp and without storage for on-grid facilities at EUR 1/Wp. The results are presented in [Table A15](#).

TABLE A15. Mining sector market sizing calculations (EUR million)

TYPE OF FACILITY	MARKET VALUE FOR OFF-GRID (EUR MILLION)	MARKET VALUE FOR ON-GRID (EUR MILLION)	TOTAL MARKET VALUE (EUR MILLION)
Large-scale mine	81.7	27.5	108.2
TOTAL	81.7	27.5	108.2

ANNEX B

Requirements for Registering a Company in Mozambique

TABLE B1. Requirements for registering a company in Mozambique

STEP	REGISTRATION / AUTHORISATION	COMPETENT AUTHORITY	TIMELINE
1	Registration with the Legal Entities Registry of Maputo	Legal Entities Registry of Maputo	2-3 days
2	Registration with the Mozambican Tax Authority	Tax Authority	7 days
3	Commencement of activities with Tax Department	Tax Authority	1-2 days
4	VAT registration	Tax Authority	1 day
5	Obtaining a standard business licence	Ministry of Industry and Commerce	7-14 days
6	Importer's card	Ministry of Industry and Commerce	8-10 days
7	Exporter's card	Ministry of Industry and Commerce	8-10 days
8	Obtaining a licence for technicians in charge of electrical installations	National Directorate of Energy	30-60 days
9	Opening of bank account with local commercial bank	Central Bank	3-5 days
10	Declaration of commencement of activities with Tax Authority	Tax Authority	3-5 days
11	Registration of the company with Ministry of Labour and Social Security	Ministry of Labour and Social Security	3-5 days
12	Registration as project investment with Central Bank	Commercial Bank	7 days

TABLE B1. Continued

STEP	REGISTRATION / AUTHORISATION	COMPETENT AUTHORITY	TIMELINE
13	Terms of Authorisation of Project Investment approval	<p>AIPEX</p> <p>Provincial Governor: 3 days</p> <p>Director of APIEX: 15 days</p> <p>Minister of economy and finance: 30 days</p> <p>Council of Minister: 120 days</p> <p>The approval of the Council of Minister depends on the agenda. Thus, the 30 days may differ up to 90 days.</p>	3-90 days
14	Establishment Licence	National Directorate of Energy	Up to 90 days
15	Construction Licence	National Directorate of Energy	15-45 days
16	Operating Licence	National Directorate of Energy	Up to 60 days

ANNEX C

Other Licence and Registration Procedures for C&I Solar Businesses in Mozambique

TABLE C1. Process for registration to repatriate funds

RELEVANT ENTITY	SUPPORTING DOCUMENTS	TIME ESTIMATE	COSTS	COMMENTS
Central Bank	<p>Registration of the Company as foreign direct investment and investors:</p> <ul style="list-style-type: none"> Form fulfilled from commercial bank of the Company Certificate of incorporation of the quota holders/shareholders of the Company Commercial certificate of Company Bordereau confirming the reception of funds issued by the commercial bank operating in Mozambique <p>Approval of shareholder loan:</p> <ul style="list-style-type: none"> Form fulfilled Certificate of incorporation of the quota holders/shareholders of the Company Commercial certificate of Company Financial statements of the Company Minutes of corporate governing body of the Company authorising the shareholder loan agreement between the Company and a quota holder/ shareholder Draft of the shareholder loan agreement 	<p>Registration of foreign direct investment and investors: 15 days</p> <p>Approval of shareholder loan: 15 days</p> <p>Approval of external loan agreement: 15 days</p>	N/A	<p>The Exchange Control Regulation simplified the loan application process by providing that loans and/or shareholder loans granted by related companies already have prior authorisation (and are only subject to subsequent registration with commercial banks operating in Mozambique) when:</p> <ul style="list-style-type: none"> They are contracted at an interest rate of 0%, their maturity is equal to or greater than 3 years and they are exempt from any type of rate or charge; and They are contracted with an exchange rate higher than 0% but lower than the base rate applicable to loans, their maturity is higher than 3 years, they are exempt from any type of rate or charge and the maximum amount is equivalent to USD 5,000,000.

TABLE C1. Continued

RELEVANT ENTITY	SUPPORTING DOCUMENTS	TIME ESTIMATE	COSTS	COMMENTS
Central Bank (continued)	Approval of external loan agreement: <ul style="list-style-type: none"> — Form fulfilled — Certificate of incorporation of the Lender — Commercial Certificate of the Company/Borrower — Draft of the external loan agreement; — Social or economic justification of hiring the external loan — Financial statements of the Company or evidence of resources to repay the external loan agreement Securities/guarantees <ul style="list-style-type: none"> — Application letter to the Central Bank — Draft of security agreement — Certificate of incorporation of the Lender — Commercial certificate of the Company 			The registration of disbursement of funds under a foreign direct investment (e.g., shareholder loan agreement, increase of share capital) shall be made within 90 days from the date of the entrance of the funds in Mozambique.

TABLE C2. Process for obtaining an environmental licence⁷⁶

RELEVANT ENTITY	SUPPORTING DOCUMENTS	TIME ESTIMATE	COSTS	COMMENTS
Ministry of Land Environment	<ul style="list-style-type: none"> Registration of the Project (IP) Terms of Reference (TdR) Pre-Feasibility and Scoping Study (EPDA) Environmental Management Plan (PGA) Simplified Environmental Study (SES) Environmental Impact Assessment (EIA) 	<ul style="list-style-type: none"> IP: 8 working days TdR: 15 working days EPDA: up to 30 working days for Cat A activities and 45 working days for Cat A + PGA: 30 working days for Cat C activities SES: 30 working days for Cat B activities EIA: 45 working days for Cat A activities and 60 working days for Cat A+ Provisional Environmental Licence valid for 2 years Environmental Licence of installation valid for 2 years Environmental Licence of activities valid for 5 years 	<p>Values:</p> <p>IP: 1,000 MZN (roughly USD 16)</p> <p>Licensing of Cat A + activities: 0.30% of the investment</p> <p>Licensing of Cat A and B activities: 0.20% of the investment</p> <p>Licensing of Cat C activities: 0.02% of the investment of the activity for projects with a value of more than 5,000,000 MZN and a unit value of 1,000 MZN for projects with an investment of up to 5,000,000 MZN. (roughly USD 15-77)</p> <p>Licence Renewal:</p> <p>Cat A+: 80,000 MZN; (roughly USD 1.2030)</p> <p>Cat A: 60,000 MZN; (roughly USD 923)</p> <p>Cat B: 30,000 MZN; (roughly USD 462)</p> <p>Cat C: 5,000 MZN (roughly USD 77)</p>	<p>In general, projects with a network connection fall under category A:</p> <ul style="list-style-type: none"> Electricity installations using hydroelectric, thermal, geothermal, photovoltaic, wind and wave energy resources; Transmission and distribution lines of 66 kV or more; Dams and reservoirs with floodable area equivalent to or greater than 5 hectares. <p>All activities involving the resettlement of the population or located in areas with special protection status in terms of ecosystem, shall also be classified as category A projects.</p> <p>Public participation is compulsory for all projects classified as belonging to categories A+, A and B, with a minimum of two rounds of meetings in each location.</p>

⁷⁶⁾ The type of licence depends on the project size, location and investment size. This is determined by the Ministry of Land and Environment on a case-to-case basis. It is expected that C&I projects will fall under Category C or B.

TABLE C2. *Continued*

RELEVANT ENTITY	SUPPORTING DOCUMENTS	TIME ESTIMATE	COSTS	COMMENTS
Ministry of Land Envi- ronment (contin- ued)				<p>The final reports prepared during the EIA process, including the Environmental Impact Assessment (EIA), the Environmental Management Plan (EMP), the Resettle-ment and Compensation Plan and the Biodiversity Compensation Management Plan, are considered public documents and the EIA authority is responsible for providing these documents for consultation at central and provincial level.</p> <p>During the EIA process, three different licences are issued:</p> <ul style="list-style-type: none"> — Provisional Environmental Licence: a licence issued after approval of the Environmental Pre-Feasibility Study (valid for two years, non-renewable). The issuance of this Environmental Permit is optional; — Installation Environ-mental Licence: a licence issued after approval of the Environmental Impact Study and submission of the approved Resettle-ment Plan, if applicable. <p>The Installation Environmen-tal Licence is valid for two years, after which it loses its validity. If the applicant maintains the interest, they must apply for renewal of the</p>

TABLE C2. *Continued*

RELEVANT ENTITY	SUPPORTING DOCUMENTS	TIME ESTIMATE	COSTS	COMMENTS
Ministry of Land Envi- ronment (contin- ued)				<p>permit within 90 days before the respective expiration date, and the environmental authority may opt, within 30 working days, for one of the following decisions:</p> <ol style="list-style-type: none"> 1) To grant renewal for a further 2 years without further studies; 2) To request a partial update of the EIA specifying any changes to the project or its components; 3) To carry out a new EIA. <p>— Environmental Exploration Permit – a permit issued after verification/ inspection to confirm full compliance of the EIA and full implementation of the Resettlement Plan (where applicable). The commencement of operations of any activity without an Environmental Permit for Exploration has been issued is prohibited and subject to a fine. The Environmental Exploration Licence is valid for five years and renewable for the same period, subject to conditions and payment of the respective fee.</p>

TABLE C3. Process for registration of the company for social security purposes

RELEVANT ENTITY	SUPPORTING DOCUMENTS	TIME ESTIMATE	COSTS	COMMENTS
Ministry of Labour, Employment and Social Security	<ul style="list-style-type: none"> — Business Licence — Declaration of commencement of activities — Copy of the passport or ID of the representative of the Company 	1-2 days	N/A	The registration of the Company shall occur within 15 days from the date of declaration of commencement of activities or acquisition of the Company.

TABLE C4. Process for registration of company personnel for social security purposes

RELEVANT ENTITY	SUPPORTING DOCUMENTS	TIME ESTIMATE	COSTS	COMMENTS
National Social Security Institute	<ul style="list-style-type: none"> — ID or passport of each employee stamped by the Company 	1-2 days	N/A	The registration of the Company shall occur within 15 days from the date of declaration of commencement of activities or acquisition of the Company.

TABLE C5. Process for registration of foreign employees for social security purposes

RELEVANT ENTITY	SUPPORTING DOCUMENTS	TIME ESTIMATE	COSTS	COMMENTS
National Social Security Institute	<ul style="list-style-type: none"> — ID or passport of each employee stamped by the Company 	1 day	N/A	Foreign employees that are already registered with a social security from the country of origin can request exemption of payment of social security in Mozambique.

TABLE C6. Process for obtaining work permits for foreign employees

RELEVANT ENTITY	SUPPORTING DOCUMENTS	TIME ESTIMATE	COSTS	COMMENTS
Ministry of Labour, Employment and Social Security	<p>Short term regime:</p> <ul style="list-style-type: none"> — Certificate of incorporation of Company — Passport of the foreign employee — Business Licence of the Company — Dates of commencement and termination of the short-term work <p>Quota regime:</p> <ul style="list-style-type: none"> — Form fulfilled — 3 copies of the employment agreement — CV of the foreign employee — Tax clearance certificate issued by the Tax Department and Social Security — Nominal list of the employees of the company — Legalised passport of the employee <p>Authorisation of work regime:</p> <ul style="list-style-type: none"> — Application letter — 3 copies of the employment agreement — CV of the employee — Tax clearance certificate from the Tax Department and Social Security — Business Licence — Nominal list of the employees of the company <p>Project approved by APIEX</p> <ul style="list-style-type: none"> — Letter communicating the contracting of the employee — Form fulfilled — 3 copies of the employment agreement — CV of the foreign employee — Tax clearance certificate issued by the Tax Department and Social Security — Nominal list of the employees of the company — Legalised passport of the employee 	<ul style="list-style-type: none"> — Short term regime: 5 days — Quota regime: 5 days — Authorisation of work regime: 15 days 	N/A	Under the quota regime and authorisation work regime, the employment agreement with foreign employees shall have the maximum duration of 2 years and any amendment shall be communicated to the Provincial Department of Employment.

TABLE C7. Process for registering of the company and employees at the Labour Department Work (Folha de Relação Nominal)

RELEVANT ENTITY	SUPPORTING DOCUMENTS	TIME ESTIMATE	COSTS	COMMENTS
Ministry of Labour, Employment and Social Security	— ID or passport of each employee stamped by the Company	10-15 days	N/A	<p>The company must notify the beginning of any activity, admission of employees and the work schedules at the Provincial Directorate of Labour, Employment and Social Security. These three documents can be submitted together.</p> <p>In addition, the company must complete and submit a form listing all employees (<i>Folha de Relação Nominal</i>) on the website of the Ministry of Labour, Employment and Social Security (http://www.mitess.gov.mz:7081/FolhaNominal/RG/RegistarEmpresa.aspx).</p> <p>This form contains detailed information on each worker and must be updated every April based on March data. When the start of business activity occurs after April, the employer must complete the form within 30 days.</p>

REFERENCES

- Abrahamson et al., 2013.** “Mozambique: Mobilizing Extractive Resources for Development,” Columbia School of International and Public Affairs, https://mozambiqueextractivedevelopment.weebly.com/uploads/1/1/0/9/11096909/mozambique_-_extractives_for_prosperity_reduced_3.pdf
- Africa Solar Industry Association (AFSIA), 2023.** “Africa Solar Outlook 2023,” <http://afsiasolar.com/data-center/outlook-report/>
- Associação Moçambicana de Energias Renováveis (AMER), 2021.** “Syrah signs MoU for solar and battery project at Balama,” <https://company-announcements.afr.com/asx/syr/7a2d65ce-43e5-11eb-ba8c-7ab64016da7f.pdf>
- Associação Lusófona de Energias Renováveis (ALER), 2017.** “Renewables in Mozambique: National Status Report, 2nd Edition,” (October 2017): <https://www.aler-renovaveis.org/en/activities/publications/national-reports/renewables-in-mozambique--country-status-report/>
- Associação Lusófona de Energias Renováveis (ALER), 2018.** “BCI Creates an Environmental Credit Line,” <https://www.aler-renovaveis.org/en/communication/news/bci-creates-an-environmental-credit-line/>
- Associação Lusófona de Energias Renováveis (ALER) and Eletricidade de Mozambique (EDM), 2018.** “Official presentation of the Mozambique National Electrification Strategy until 2030,” (20 November 2018): <https://www.aler-renovaveis.org/en/communication/news/official-presentation-of-the-mozambique-national-electrification-strategy-until-2030/>
- Aurora Solar.** “How to Pay for Commercial Solar: A Financing Guide to Contractors,” <https://aurorasolar.com/blog/how-to-pay-for-commercial-solar-a-financing-guide-for-contractors/>
- Bank of Industry, Nigeria.** “Solar Energy Fund,” <https://www.boi.ng/products/solar-energy-fund/>
- Bloomberg New Energy Finance, responsAbility and Global Climate Partnership Fund, 2019.** “Solar for Businesses in Sub-Saharan Africa,” https://assets.ctfassets.net/rwjxompt-tyc4q/486i7zSUKVyDrh1cKWG4h8/a65a851b401c1abbc-42403320cf714a5/Solar_for_business_rA_1.pdf
- Business Day, 2019.** “The Nigerian Energy Report 2019: Disruptors: How off-grid energy companies are closing Nigeria’s energy access gap,” https://www.all-on.com/media/publications/jcr_content/par/textimage_1943192789.stream/1560239896557/8df5c9fbfccfa74ffaf52c28a4ccd4ef-6d90e26b/the-nigerian-energy-report-updated.pdf
- De Amaral, L., and Mussagy, K., 2019.** “Mining in Mozambique: Overview,” SAL & Caldeira Advogados, [https://uk.practicallaw.thomsonreuters.com/0-575-3315?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/0-575-3315?transitionType=Default&contextData=(sc.Default)&firstPage=true)
- Dondeyne, S. and Ndunguru, E., 2014.** “Artisanal gold mining and rural development policies in Mozambique: Perspectives for the future,” *Futures* 62: https://www.researchgate.net/publication/260995411_Artisanal_gold_mining_and_rural_development_policies_in_Mozambique_Perspectives_for_the_future
- Electricidade de Moçambique, 2020.** “Relatório e Contas, Annual Report, 2020,” <https://www.edm.co.mz/en/node/5321>
- ESI Africa, 2021.** “Five solar PV financing options for C&I businesses in South Africa,” <https://www.esi-africa.com/industry-sectors/finance-and-policy/five-solar-pv-financing-options-for-ci-businesses-in-south-africa/>
- Green Building Africa, 2021.** “Mozambique: First Off-Grid Commercial (400 kWp) Solar/Battery Hybrid Project Back on Track,” <https://www.greenbuildingafrica.co.za/mozambique-first-off-grid-commercial-400kwp-solar-battery-hybrid-project-back-on-track/>
- GreenCape, 2018.** “Energy Services: 2018 Market Intelligence Report,” <https://www.greencape.co.za/assets/Uploads/GreenCape-Energy-Services-2018-MIR-25052019.pdf>
- Havenhill Synergy Limited, 2021.** “Financing Off-grid Electrification: A multi-instrument approach,” <https://havenhillsynergy.com/financing-off-grid-electrification-mini-grids-multi-instrument-approach/>
- Hutchins, M., 2023.** “Africa closing in on gigawatt-level solar,” *PV Magazine*, <https://www.pv-magazine.com/2023/01/19/africa-closing-in-on-gigawatt-level-solar/>

- IEA, IRENA, UNSD, World Bank, WHO, 2022.** “Tracking SDG7: The Energy Progress Report, 2022,” <https://iea.blob.core.windows.net/assets/8b276fc2-c1ae-4a54-9681-eea1eb143d7f/TrackingSDG7TheEnergyProgressReport2022.pdf>
- Innovate UK and UK Aid, 2020.** “Energy Catalyst – Country Guide: Mozambique,” <https://energycatalyst.ukri.org/wp-content/uploads/2023/06/Country-Guide-Mozambique.pdf>
- Instituto Nacional de Estatística, Moçambique, 2019.** “Estatísticas Industriais, 2019,” https://www.ine.gov.mz/web/guest/d/publicaestatisticas-industriais-2019_20200928
- Instituto Nacional de Estatística, Moçambique, 2019.** “Anuário Estatístico – Statistical Yearbook, 2019,” <https://www.ine.gov.mz/web/guest/d/anuario-estatistico-2019-web-cpl>
- Instituto Nacional de Estatística, Moçambique, 2019.** “Estatísticas do Turismo, 2019,” https://www.ine.gov.mz/web/guest/d/estatisticas-do-turismo_2019
- Japan International Cooperation Agency (JICA), 2018.** “Integrated Master Plan Mozambique Power System Development Final Report,” (February 2018): <https://openjicareport.jica.go.jp/pdf/12318606.pdf>
- Kenya Association of Manufacturers.** “AFD, KAM Provide Green Energy Financing in East Africa,” <https://kam.co.ke/afd-kam-provide-green-energy-financing-in-east-africa/>
- Naidoo, K., and Loots, C., 2020.** “Mozambique - Energy and The Poor: Unpacking the Investment Case for Clean Energy,” UN Capital Development Fund (UNCDF), <https://www.uncdf.org/article/6474/energy-and-the-poor-unpacking-the-investment-case-for-clean-energy>
- Observatório do Meio Rural (OMR), 2021.** Macroeconomia das Pescas em Moçambique: <https://omrmz.org/observador/or-105-macroeconomia-das-pescas-em-mocambique/>
- Pekkala, Y, et al., 2008.** “Review of Industrial Minerals in Mozambique,” Geological Survey of Finland, Special Paper 48, 307–321, <http://www.acismoz.com/wp-content/uploads/2017/06/Review%20of%20Industrial%20Minerals%20in%20Mozambique.pdf>
- Smith, T., 2022.** “Another financial boost for the Africa C&I solar sector,” ESI Africa, <https://www.esi-africa.com/industry-sectors/finance-and-policy/another-financial-boost-for-the-africa-ci-solar-sector/>
- Souto, M., 2014.** “Artisanal Fisheries and Climate Change Project (FishCC): Environmental and Social Management Framework (ESMF),” Instituto Nacional de Desenvolvimento da Pesca de Pequena Escala, https://ewsdata.rightsindevelopment.org/files/documents/92/WB-P149992_tltArTb.pdf
- Tetra Tech International Development, UK Foreign, Commonwealth and Development Office (FCDO) Africa Clean Energy Technical Assistance Facility, 2021.** “Stand Alone Solar (SAS) Market Update: Mozambique,” <https://www.ace-taf.org/wp-content/uploads/2021/04/Stand-Alone-Solar-SAS-Market-Update-Mozambique.pdf>
- Towards Sustainable Energy for All Mozambique (TSE4ALLM),** “US \$ 1 million credit line launched for the financing of Renewable Energy systems for productive uses in rural areas of Mozambique,” <https://www.tse4allm.org.mz/index.php/en/media/success-stories/lancada-linha-de-credito-de-1-milhao-de-dolares-para-energias-renovaveis>
- United States Agency for International Development (USAID), 2021.** “Agriculture and food security in Mozambique,” <https://www.usaid.gov/mozambique/agriculture-and-food-security>
- World Bank, 2019.** “Republic of Mozambique Agrarian Sector Transformation : A Strategy for Expanding the Role of the Private Sector,” <https://openknowledge.worldbank.org/handle/10986/32101>

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