



**ELECTRICIDADE
DE MOÇAMBIQUE, E.P.**

EDM STRATEGY 2018-2028

Lighting Mozambique's Transformation

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Executive Summary

Mozambique is in transition. It is committed to faster progress, increasing incomes and producing jobs for its young and growing population. Jobs will come from diversified economic growth and enhanced productivity. Growth will be promoted by the Government but driven by the private sector. The Government has committed to universal access to electricity by 2030. To achieve these goals Mozambique needs affordable and sustainable electricity. It is endowed with a mix of energy – hydro, coal, natural gas, solar and wind – well in excess of what is needed to meet its internal electricity demand for decades to come. It can provide least-cost solutions for the region.

To seize the opportunity, Mozambique needs a smart electricity utility that is digitally enabled, efficient, financially viable and commercially minded. *Electricidade de Moçambique* (EDM) should play this role. EDM has many strengths, but also fragilities, as its operating model is no longer fit for purpose. All stakeholders have said they want change and EDM is determined to respond through a new business model. The 2018-2028 strategy sets out EDM's Vision for the next decade and provides the strategic direction for change and transformation. It is complemented by the National Electrification Strategy and the Integrated Master Plan on Power Development.

A core development challenge for Mozambique as for EDM is to provide quality electricity, to expand generation and transmission capacity to meet growing domestic demand, promote industrial development and widen access to energy. The Integrated Master Plan on Power Development sets out an approach to new investment, changing the energy mix, improving system reliability and extending the grid. In the immediate phase, priority will be given to increasing generation capacity and promoting cleaner energy. In the subsequent phases, EDM will focus on transmission and distribution system bottlenecks hampering the security of supply. Substantial external investment will be required. To attract finance on affordable terms, EDM must be transformed into a financially viable utility. Over the next decade, EDM will lay the foundations for Mozambique to capture export

opportunities and become a regional electricity hub.

At present, EDM is not financially viable. Current electricity tariffs do not cover the cost of supply. EDM has substantial debts, but it has prepared a financial recovery plan with defined milestones, taking action on both costs and revenue. Absolutely critical is to move now to cost-reflective tariffs, as proposed in the National Electrification Strategy (NES). More use can be made of existing assets. Additional lower cost power should be made available from *Hidroeléctrica de Cahora Bassa* (HCB) for the domestic market, with benefits accruing to consumers and business. To achieve this, EDM will meet its commercial obligations to HCB and has now repaid \$104 million historic debt.

EDM will have two business streams: commercial and social. The NES set out a framework for universal access and subsidised supply to the poor. Electrification can transform household and community life, providing improved security and better services and promoting enterprise. EDM will not and should not try to do everything. However, given the limited capacity elsewhere, EDM will take a leadership role in overall project management, working primarily in partnership with FUNAE (*Fundo de Energia*). Achieving universal access will require wholesale changes in EDM's operations, logistics and systems. These are under way. A fundamental condition for success will be the early establishment and adequate financing of the Electrification Fund.

The enabling environment is also fundamental. Government should ensure a comprehensive planning and regulatory framework, policy consistency and project co-ordination, plus clear criteria for resource prioritisation, in which EDM plays a key and active role. EDM's corporate governance should evolve accordingly, in keeping with best practice. Government should define the overall goals and targets. The EDM Board should then set the strategy and plans. Management will implement the strategy and will be held to account by the Board. Stakeholders will be consulted. Information on costs, revenue and performance will be transparent and verifiable by independent audit.

The transformation program is underpinned by detailed management action plans. Within the next ten years, Mozambique will have increased generation and transmission capacity, and increased exports. Over 80 percent of Mozambicans will have access to electricity. EDM will be financially sustainable, covering all of its costs, attracting

commercial capital and meeting targets for quality and reliability of service. A results framework based on a Delivery Performance Measurement System (DPMS) will guide regular monitoring and reporting on the Strategy's implementation. The Board will review progress on a six-monthly basis and will conduct a medium term review by 2023.

Message from the Chairman

The great dam at Cahora Bassa, rising up from the mighty Zambezi River, commenced as a colonial project to supply electricity to South Africa. This extraordinary engineering feat created Africa's fourth-largest artificial lake, and has since 1975 proven a tremendous regional development asset. It has given Mozambique a steady stream of income, providing a platform for fiscal stability.

Now we must *finish the job*, as Cahora Bassa's name means in the Nyungwe language, unleashing Mozambique's potential to power its path from poverty to prosperity. We must give all our people access to electricity.

Electricidade de Moçambique (EDM) is at the centre of this energy revolution. It is the principal means to add value to agriculture and to our mining exports. It will catalyse our industrialisation, and keep the lights on in our homes, schools and clinics. It will enable our learners to study at night and reduce the cost and distance from markets and centres of knowledge. It will brighten our tourist industry. It will sustain technology, productivity and excellence in a digital age. EDM will play its essential part in our national goal of universal energy access by 2030.

At a moment where climate change threatens the security of citizens and states alike, Mozambique is blessed with a mix of energy resources. The methods and means of realising the country's significant energy potential both domestically and regionally are contained within this Ten-Year Strategy.

Government has committed to reform Mozambique's state-owned enterprises. EDM can lead the way. To do so, we must ensure EDM's financial and commercial viability. We must improve efficiency and structure for success. We must eliminate our losses to provide the means to invest for tomorrow – we must be 'future redy'. We aim to transform EDM into a model commercial, financially sustainable smart utility, capable of delivering clean, efficient electricity and quality services to our customers in Mozambique and the region, playing our part in achieving universal access in Mozambique.

We know what we need to do and I am confident that EDM will play a pivotal role in lighting Mozambique's transformation, and ensuring a bright future for all its citizens.



Dr Mateus Magala
Chairman and CEO

Glossary

ARENE	<i>Autoridade Reguladora de Energia</i>	kW	Kilowatt
BPC	Botswana Power Corporation	LNG	Liquefied Natural Gas
CEZA	<i>Companhia Elétrica do Zambeze</i>	LV	Low Voltage
CNELEC	Conselho Nacional de Eletricidade	MIREME	Ministry of Natural Resource and Energy
CTA	<i>Confederação das Associações Económicas</i>	MOTRACO	Mozambique Transmission Company
CTM1	<i>Central Térmica de Maputo 1</i>	MOZAL	Mozambique Aluminium
CTM2	<i>Central Térmica de Maputo 2</i>	MoZiSa	Mozambique – Zimbabwe – South Africa
CTRG	Central Térmica de Ressano Garcia	MW	Megawatt
DPMS	Delivery Performance Measurement System	NES	National Electrification Strategy
EDM	<i>Electricidade de Moçambique</i>	NOEA	Non-Obligation Expansion Area
EMEM	<i>Empresa Moçambicana de Exploração Mineira</i>	OEA	Obligation Expansion Area
ENH	<i>Empresa Nacional de Hidrocarbonetos</i>	PPA	Power Purchase Agreement
ESCOM	Electricity Supply Corporation of Malawi	PPP	Public–Private Partnership
ESKOM	South African Electric Utility Supplier	REFIT	Renewable Energy Feed-in Tariff
FUNAE	<i>Fundo de Energia</i>	SADC	Southern African Development Community
GDP	Gross Domestic Product	SAPP	Southern African Power Pool
GoM	Government of Mozambique	SPV	Special Purpose Vehicle
HCB	<i>Hidroelétrica de Cahora Bassa</i>	STE	<i>Sociedade Nacional de Transporte de Energia</i>
HDI	Human Development Index	TANESCO	Tanzania Electric Supply Company Limited
HVAC	High Voltage Alternating Current	UNDP	United Nations Development Programme
HVDC	High Voltage Direct Current	ZESA	Zimbabwe Electricity Supply Authority
ICT	Information and Communications Technology	ZESCO	Zambia Electricity Supply Corporation
IFIs	International Financial Institutions		
INE	<i>Instituto Nacional de Estatística</i>		
IPP	Independent Power Producer		

Acknowledgements

This Ten-Year Strategy was prepared internally by a technical team appointed by the CEO and led by Marcelino Alberto, comprising, Amilton Alissone, António Nhassengo, Mateus Odallah and Olga Utchavo, along with Pedro Simão from the Tony Blair Institute.

The technical team was supported and guided by its international advisors, Mr Graham Stegmann and Dr Greg Mills. A steering committee comprising the CEO and Executive Directors was established to monitor the progress of the report and to make decisions at key stages.

The Strategy was developed with a focus on two components: innovation and inclusivity. It was tasked to be as innovative as necessary, and to engage all relevant stakeholders. A consultation process was undertaken internally through a combination of personal interviews, consultations, questionnaires and surveys with the Executive Board, managers at a variety of levels, the EDM workforce and large and small customers. We would like to acknowledge the contributions made by Mozal, Motraco, Vale, Cimentos and Kenmare in particular. Civil society also contributed through its consumer protection association, DECOM. Valuable contributions were also received during the consultation with public institutions such as FUNAE, ARENE, ENH, and EMEM. The private sector, represented by CTA, has given valuable feedback about the major challenges and concerns regarding the productive use of energy. We would also like to recognise the special contribution of HCB in the

constructive discussions carried out, and in arranging a field visit to Cahora Bassa in March 2018.

The draft Strategy was circulated to the EDM workforce for their comment, and to the general public through the EDM website. It has also been peer-reviewed by a number of local and international experts, including the former Chairman of EDM, Vicente Veloso, the Mozambican representative of the International Monetary Fund (IMF), Ari Aisen and the Mozambique Country Manager of the African Development Bank (AfDB), Pietro Toigo.

The draft strategy was then presented to the Energy Sector Working Group that comprise the development partners community, where constructive discussion where held and resulted in further enhancement of the document.

Finally, the Government of Mozambique willingly contributed insights and counsel at various points in the formulation of this Strategy, especially through ministerial-level meetings. Special thanks go to the former Minister of Mineral Resources and Energy, Leticia Klemens, in this regard; the former Minister of Industry and Commerce and current Minister of Mineral Resources and Energy, Max Tonela; the Minister of Economy and Finance, Adriano Maleiane, the Minister of Land, Environmental and Rural Development, Celso Correia; the Minister of Transport and Communication, Carlos Mesquita; the Minister of Culture and Tourism, Silva Dunduru; and the Deputy Minister of Agriculture and Food Security, Luisa Meque.

EDM's Vision and Mozambique's Transformative Development

Electricidade de Moçambique (EDM) must operate as a commercial, financially sustainable 'Smart (digitally integrated) Utility' in delivering clean, efficient electricity and quality services to its customers across southern Africa, and playing a key role in achieving universal access in Mozambique.

Energy is at the epicentre of realising the potential of all Mozambicans.

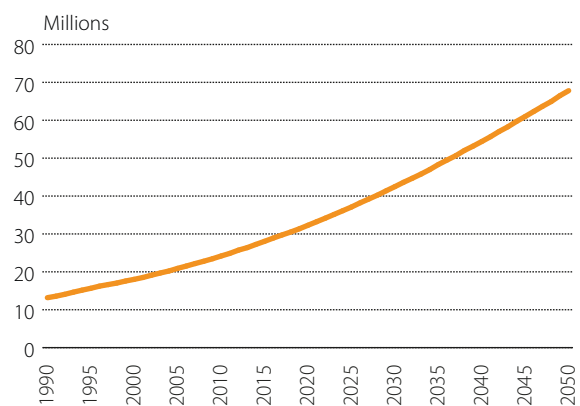
Mozambique is a low-income country of about 29 million people. Less than one-third of the population currently enjoys access to electricity. But electricity has a central role to play in reducing inequality and exclusion, in providing basic services such as health and education, and in promoting economic diversification, industrialisation and competitiveness. It follows that EDM's mission is to generate, transmit and distribute reliable electricity supply to underpin Mozambique's sustainable and inclusive development and transformation. Over the past two generations, Mozambique has undergone two significant transformations: from colonialism to majority rule in 1975 and from conflict, through democracy, to a development agenda since 1994. As one measure of our progress, life expectancy has increased from 41 years in 1975, to 44 in 1994, and to 57 now.

'Energy is at the epicentre of realising the potential of all Mozambicans'

We stand on the cusp of a third transformation (with an eye on a fourth industrial revolution), from a largely agrarian and rural economy to one more closely integrated with regional and global markets. It will be based on services and manufacturing, which depend almost universally on reliable and affordable power. This transformation should deliver a Mozambique, not only free from poverty but on the path to prosperity, rich in opportunity, in transit from a least-developed to a middle-income country within the next generation. Achieving this positive next step requires clear leadership from Government to provide an enabling environment, integrated planning and investment, and a stable

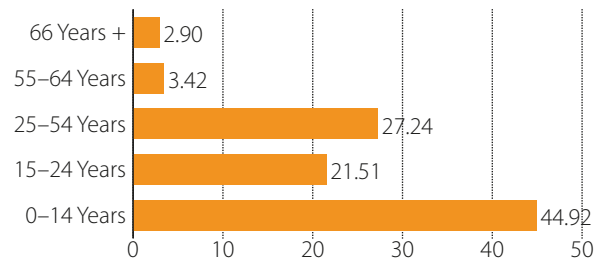
macroeconomic framework. This demands difficult choices in setting priorities and building institutional capability and sound policies. The choices cannot be made without greater transparency, closer monitoring, commercial common sense, and improved accountability. They require a synergy of people, ideas, systems and technology and a culture of excellence, and not one of mediocrity.

Figure 1: Mozambique's projected population, 1990–2050



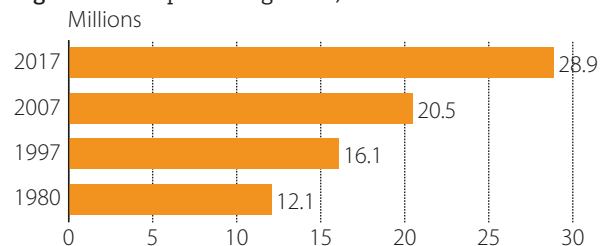
Source: https://www.indexmundi.com/pt/mocambique/distribuicao_da_idade.html

Figure 2: Mozambique's population age range, 2016



Source: https://www.indexmundi.com/pt/mocambique/distribuicao_da_idade.html

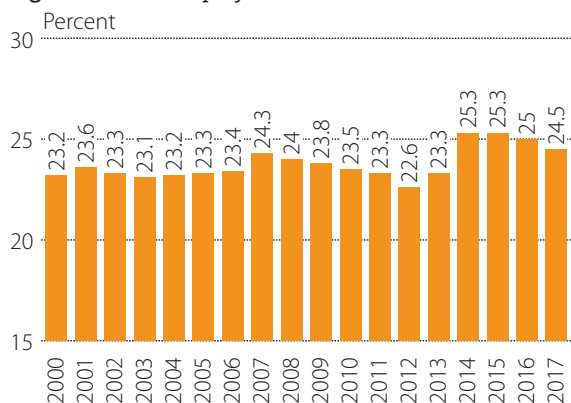
Figure 3: Population growth, 1980–2017 census data



Source: IV Recenseamento Geral da População e Habitação 2017

This third transformation will partially be driven by demography. Mozambique’s population is projected to more than double, to 65 million, by 2050. According to the preliminary results of *Census 2017*, in the last ten years the population growth was 8.4 million against 4.4 million in the previous decade. Much of the projected increase will occur in the cities, from 9 million today to 30 million over the next generation. This transformation will also be driven by a blend of expectations, information and education. Mozambique’s rate of adult literacy has more than doubled since 1980, to over 58 percent. Mobile teledensity has increased sevenfold to nearly 70 subscriptions per 100 people in the decade from 2006 to 2016. Three components – technology, connectivity and education – will inevitably produce both pressure and opportunities for transformation. Mozambique requires a step change if it is to achieve its ambitious development goals.

Figure 4: Unemployment rate



Source: https://pt.theglobaleconomy.com/Mozambique/Unemployment_rate/

Over 60 percent of Mozambique’s population is considered ‘youth’ – most of them less than 14 years old. This translates into an imperative over the next decade to equip this next generation by intensifying investment in schools and to help to create conditions that will ensure jobs. Both these aspects will, in turn, demand reliable electricity supply.

The need for transformation is not only between generations, however, but also between genders. No country can be successful if half its population does not enjoy full access to economic opportunities. EDM can spur greater gender equality not

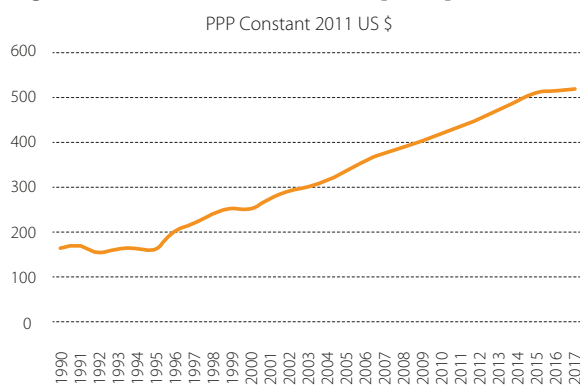
only in the longer term through improved access to electricity and the commercial and income opportunities this can create, but more immediately through leadership by ensuring gender equality in EDM management and operations. The values of integrity, transparency, professionalism, competitiveness, equal opportunity and team spirit must guide our actions.

This point of departure can only assist Mozambique’s war against poverty and in achieving its ambitions of excellence.

**Guiding Our Actions: EDM’s Values
Integrity, Transparency, Equality,
Competitiveness and Team Spirit**

Even though its wealth per capita has doubled over the last 25 years, as detailed in Figure 5 below, Mozambicans remain, on average, very poor. Between 2003 and 2009, for example, poverty fell by just four percentage points, and more than half of the population today still lives in poverty. This reflects high income inequalities between urban and rural areas in particular, and the large number of people who remain dependent on subsistence agriculture. More than 70 percent of poor households are located in rural areas, far from local let alone international markets.

Figure 5: Gross national income per capita



Source: World Bank

At the same time, we are missing out on enormous, fresh development opportunities. Just 16 percent of our arable land is currently cultivated. Very few subsistence farmers can find a route out

of poverty without access to markets or without adding further industrial value. Mozambique's geography offers access to international markets for the landlocked producers of southern Africa, yet our ports operate below their potential capacity.

Mozambique is among the eight countries in the world with the lowest Human Development Index (HDI), ranking 181st in 2016, according to the United Nations Development Programme (UNDP) Human Development Report. In the HDI assessment, Mozambique ranks the lowest of any of the 15 member states of the Southern African Development Community (SADC).

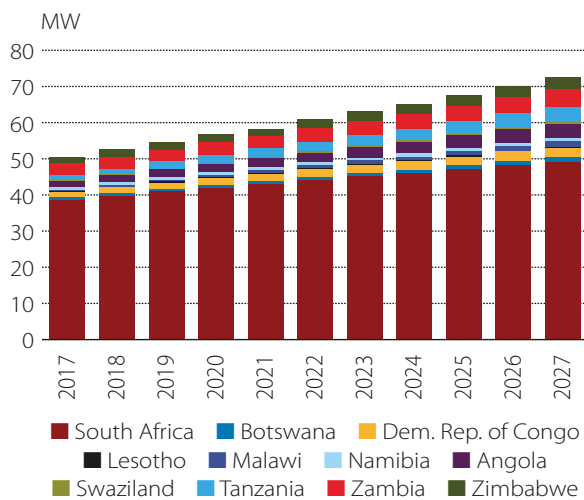
Mozambique can no longer afford to be just an exporter of raw commodities and talent and a conduit for manufactured goods of others. We must avoid creating industrial development islands within Mozambique and instead integrate and power our industrial development corridors and zones.

'Without energy, agriculture in Mozambique is a story of unrealised potential and enduring poverty'

Transforming our theoretical potential of people, raw materials and location into the practical reality of industrial development, growth and jobs is the challenge and opportunity of this generation.

Electricity will light Mozambique's third transformation.

Figure 6: Projected maximum demand of SAPP countries



Source: SAPP Regional Generation and Transmission Expansion Plan 2017

Mozambique is endowed with considerable primary energy resources including renewable energy from solar, hydropower and wind and large gas reserves on - and off-shore, sufficient not only to meet domestic demand rising at some 8 percent annually but also to export competitively to the SADC region. Electricity access across this region is only 36 percent, and increasing it is a priority for all countries. Projections suggest that demand from SADC will increase by 50 percent by 2030. As Figure 6 illustrates, there is a significant commercial opportunity in the regional supply of power. Southern Africa's demand, for example, is projected to increase by more than 40 percent with effect from 2017 to around 72,000MW.

According to Table 1 (Southern African Power Pool (SAPP) supply vs demand), many countries in the southern region experienced an electricity shortfall in 2017. Mozambique should adequately prepare itself to take advantage of the commercial opportunities that the regional electricity market affords.

Southern Africa's success will be our success, too.

EDM's Vision

Transform EDM into a Smart and Sustainable Utility, which gives access to quality electricity to every Mozambican and holds leadership in the regional market

Take the rural areas where 70 percent of Mozambique's population lives. Alongside electricity comes the prospect of a positive cycle of refrigeration, lighting, agri-business and irrigation – improving healthcare, facilitating education and enabling agro-processing and facilitating higher yields. Irrigation can increase yields by as much as 50 percent for cash crops and 150 percent for staples such as maize. This reduces the pressure on the land, allows for growth in a cash economy, and permits investment in shelling and grinding facilities, adding still more disposable income. Power distribution grids can, and will, become a focus of agro-based investment, a site of growth and diversification from logistics to cold storage, banking, and extension services.

Without energy, agriculture in Mozambique is a story of unrealised potential and enduring poverty.

Mozambique’s Development Plan highlights industrial development, infrastructure and tourism. To improve productivity and become more competitive, industry needs stable and reliable electricity supply. To open up the hinterland and connect the country, the rail network can be economically

powered by cleaner energy. A countrywide communication network will also rely on electricity.

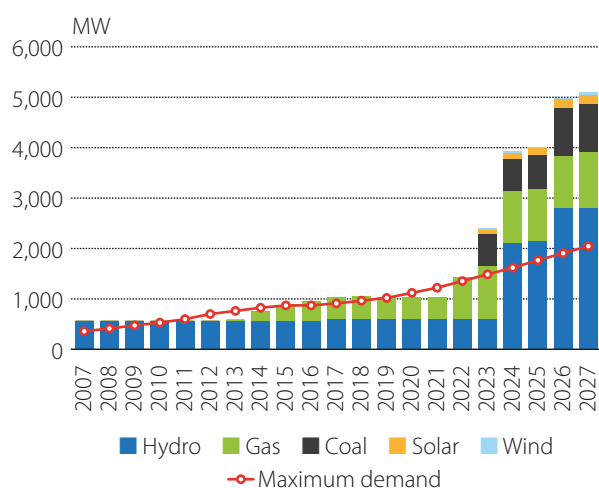
According to the power availability and demand forecast in Figure 7, Mozambique will experience an electricity shortfall around 2020. After 2021, the least-cost generation expansion plan predicted in the Integrated Masterplan will allow Mozambique to have an energy surplus which can be traded at a competitive price in the regional market.

Table 1: SAPP supply vs demand – 2017
MW

	Installed Capacity	Operating Capacity	Peak Demand	Peak Demand Plus Reserves	Excess/ (Shortfall)
Angola	3,129	2,500	1,869	2,138	362
Botswana	927	459	610	698	(239)
Dem. Rep. of Congo	2,457	1,076	1,376	1,574	(498)
Lesotho	74	70	150	172	(102)
Malawi	352	351	326	373	(22)
Mozambique	2,724	2,279	1,850	2,116	163
Namibia	538	354	647	740	(386)
South Africa	50,774	48,463	38,897	41,374	7,089
Swaziland	70	55	232	265	(210)
Tanzania	1,366	823	1,051	1,202	(379)
Zambia	2,734	2,734	2,194	2,510	224
Zimbabwe	2,045	1,555	1,615	1,847	(292)
Total SAPP	67,190	60,719	50,817	55,009	5,710

Source: <http://www.sapp.co.zw/demand-and-supply>

Figure 7: Mozambique Supply vs Demand forecast



Source: EDM Annual Statistical Reports vs Master Plan

Mozambique’s next stage of economic transformation, therefore, must involve clear definition of priorities driving long-term integrated planning and sequencing of investments, system-wide

approaches and policy consistency. In short, we need to put people first in Mozambique’s development.

To achieve a brighter future, we must focus our energies on the sectors that offer us the greatest rewards and the systems that will enable us to deliver them. Mozambique will need to be more competitive – become faster and more efficient. We cannot function competitively without a skilled and healthy workforce, and without access to technology. We need to raise more revenue – just as any developing economy dealing with concerns of poverty, education and healthcare – but we also need to spend it wisely, making sure we get value for money and gain the full impact that our investment deserves. We have to do this through the rule of law, by ensuring that legal and governance institutions eliminate any practices that encourage malfeasance.

The Background to Mozambique's Power Sector

Power is at the heart of Mozambique's development, and as the state-owned public utility responsible for electricity generation, transmission, distribution and commercialisation since 1977, EDM is the key instrument of this transformative resource.

The Ministry of Natural Resources and Energy (MIREME) is responsible for the overall policy, institutional and regulatory framework. It sets access targets, approves tariffs (although going forward this role has been entrusted to the new energy regulator ARENE), and issues licences. The National Council of Electricity (CNELEC) was created by the Electricity Law in 1997 to protect the public interest in the provision of electricity services, acting as a consultation body, and advising Ministers on matters relating to the national electricity sector, as well as on the implementation of relevant legislation.

While EDM focuses its activities on grid power, *Fundo de Energia* ('Energy Fund' – 'FUNAE') aims to promote the development and use of different forms of low-cost, off-grid power. *Hidroelétrica de Cahora Bassa* (HCB) is the major national generation asset. It operates generation through its hydro-power plant with an installed capacity of 2,075MW and transmission through a high-voltage direct current system connecting it to the South African power grid. EDM has an 85 percent stake in HCB through *Companhia Eléctrica do Zambeze* (CEZA), a wholly-owned subsidiary of EDM.

Companhia de Transmissão de Moçambique SARL, also known as Motraco, is an independent transmission company owned by EDM (33 percent), Eskom (33 percent) and SEC (33 percent). Motraco supplies 950MW of electricity to Mozal, the aluminium smelter in Maputo, along with power to EDM and SEC. Motraco owns two high-voltage transmission networks linking Mozal in Maputo to the Eskom network in South Africa, one being through Swaziland.

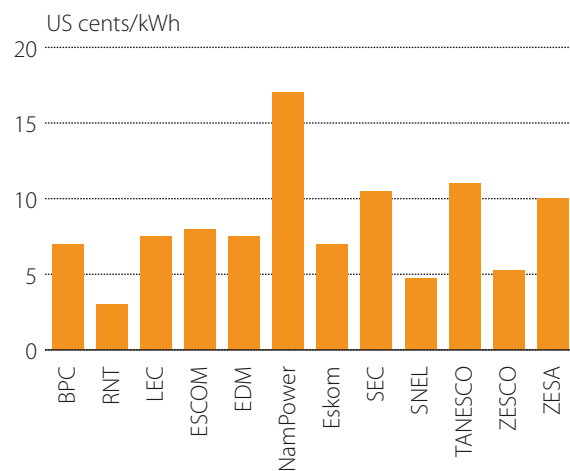
While the Electricity Law opened room for more players in the power sector, private sector participation has only materialised in the generation

segment through three independent power producers (IPPs): CTRG (175MW), Gigawatt (110MW) and Kuaninga (40MW), all with power purchase agreements (PPAs) with EDM.

Despite the increase in the number of connections to around 1.5 million customers, just one-quarter of Mozambicans have access to electricity, mostly in urban areas. This is due, in part, to an underdeveloped and poorly connected power distribution network, a private sector that has historically been excluded from investing in projects in this sector and tariffs that remain too low to fund new expenditure and yet are beyond the reach of many, especially poorer Mozambicans, without subsidies.

EDM operates within these constraints. It acknowledges that the Government has to decide what it will do and, where we prefer private sector involvement, what levels of tariffs we can support, how much electricity we will retain for domestic use and how much we will export to the region, how we can instill greater efficiencies and what our energy mix should be. For EDM, the key issue is how we can successfully balance meeting commercial imperatives and the need for financial sustainability with providing affordable electricity and achieving universal access.

Figure 8: Average electricity tariff



Source: SAPP general statistics 2016/2017

A number of contradictions and difficult questions must be addressed in our Strategy:

- ▶ A key, fundamental, challenge hinges around cost and tariff structures that have led to a deterioration in EDM's financial situation. EDM's costs have risen faster than revenues from the sale of electricity. The gap between tariffs and cost of supply has widened in recent years, exacerbated by the large depreciation of the metical against the US dollar and the South African rand in 2015–2016. Recent increases in tariffs have narrowed the gap but it is still some 20%. For EDM to become financially sustainable, cost-reflective tariffs are essential.
- ▶ Mozambique's current power supply peak is around 911MW, of which 500MW sourced from HCB is made up of 300MW of 'firm' power and 200MW of 'non-firm' power. For additional power above and beyond this quantity EDM pays around 15 US cents/kWh, about three times what Eskom in South Africa pays HCB for the regular supply of 1,500MW.
- ▶ In realising a wider regional role, Mozambique needs to ask whether it is possible to achieve universal access, operate the Mozal aluminium smelter and export power to the region.

'For EDM to become financially sustainable, cost-reflective tariffs are essential'

- ▶ EDM needs to determine whether, and how, it can sustainably subsidise tariffs and, at the same time, make sufficient profit to fund new electricity projects.
- ▶ Related to the above, EDM must establish the extent to which it can act as a developmental agency or a commercial entity.

EDM's Historic Strengths and Challenges

In understanding the nature of the operational and strategic challenges that lie ahead, EDM surveyed key constituencies in preparing this Strategy. The findings are highlighted below:

EDM: There is a great appetite for change within the organisation, with high levels of unhappiness about personal progress and training. Nearly 60 percent of those polled were not satisfied with their current working conditions and remuneration, and nearly 77 percent were unhappy with their training. Just 26.3 percent of respondents were satisfied with the company overall. Unsurprisingly, more than two-thirds of respondents are in favour of EDM's transformation process.

Customers: Over 56 percent of respondents consider the energy they consume from the EDM network to be of low or poor quality. Just 16.7 percent consider the service provided to be 'normal', and 26.7 percent consider it bad. More than 63 percent believe that the quality of energy and the tariff level together represent the most important considerations. The unreliability of the power supply is highlighted by the fact that 76.7 percent of customers surveyed rely on private generators. Only 26.7 percent of customers surveyed consider EDM workers to be 'professional'.

The message from these constituencies is clear: there is a need to improve the working conditions and quality of service of EDM.

Any strategy has to be mindful of the historic strengths and fragilities of the power utility and act on them. These are depicted in detail in the Appendix.

As set out above, the power sector has the potential to change the trajectory of Mozambique's development towards higher diversification and job creation. It has a tremendous asset in Cahora Bassa, and there is considerable upside produced by a combination of regional demand, digital efficiencies, improved skills and the store of renewables possessed by Mozambique, along with the currently low coverage among the population. The last factor, combined with a burgeoning, youthful population, will likely drive demand forwards. This younger generation, increasingly estranged from the country's liberation and democratisation, is interested in the future, not the past, as expressed in the demand for healthcare, education and employment prospects. Mozambique has to address several tensions as it seeks to expand its coverage – not least between the desire, on the one hand, for cheap power and, on the other, for reliable,

quality services; and between the cash flow offered by regional payments and the development possibilities inherent in increasing domestic supply.

‘Power can play a meaningful part in Mozambique’s development by putting in place the necessary capacity, detailing the correct energy mix, instituting investment policies that are business and tax friendly, and ensuring the collection and proper use of revenue by the power distributors to ensure a minimal and predictable burden on all consumers’

In addition to the tensions and challenges noted regarding EDM’s financial position, there are also a number of clear external risks in governance, macroeconomics, institutional capacity and climate change.

An analysis of the strengths, weaknesses, opportunities and threats confronting the power sector in Mozambique confirms four important points of departure for this Strategy and for the transformation of EDM:

- ▶ EDM’s current mandate needs to change. The mandate needs to be part of a coherent long-term integrated development and investment strategy for generation and transmission.
- ▶ EDM must become more efficient, moving quickly on financial restructuring in order to

become a financially viable and environmentally sustainable, commercially based and customer-focused organisation.

- ▶ EDM has significant potential to play a key role in Mozambique and southern Africa’s development.
- ▶ Working in partnership with others, EDM can make a major contribution to the Government’s 2030 goal of universal access.

Power can play a meaningful part in Mozambique’s development by putting in place the necessary capacity, detailing the correct energy mix, instituting investment policies that are business and tax friendly and ensuring the collection and proper use of revenue by the power distributors to ensure a minimal and predictable burden on all consumers. This will require a different development context overall in both policy and bureaucracy. Mozambique currently ranks 138th of 190 in the World Bank’s *Ease of Doing Business* indicators, 137th in starting a business, 104th in registering property, 56th in dealing with construction permits and 150th in getting electricity.

Overall, to achieve our meaningful and positive role in Mozambique’s national development, we must align the electricity sector to Government priorities and thereby to our people’s needs.

These issues provide a clear departure point for this Ten-Year Strategy.

Identifying the Drivers

Agriculture, energy, infrastructure and tourism are the four priorities defined by the Government of Mozambique. Those priorities are centred on increasing employment, productivity and competitiveness to improve the living conditions of Mozambicans in the countryside and in the city, in an atmosphere of peace, harmony and tranquillity, consolidating democracy and participatory and inclusive governance.

‘Universal access ... can only be accomplished by ending business as usual’

Electricity is a key commodity for development; a game changer in the transformation of Mozambique from a low to a middle-income country. EDM will become a low-cost, preferred supplier of clean energy to southern Africa and in so doing play a central role in the industrialisation of Mozambique, in the transformation of raw materials into finished products, and in the creation of domestic jobs. This requires harnessing the country’s natural resource advantages fully, in conjunction with local and foreign capital. In so doing, EDM will support the aim of the Government of

Mozambique to achieve 58 percent access to the grid by 2023 and 100 percent access by 2030.

To realise these national development goals, according to the integrated Masterplan in the next 25 years, Mozambique aims to add 5,780MW, requiring US\$34 billion in total capital, made up of US\$18 billion in investment capital in generation facilities, US\$9 billion in transmission and US\$7 billion in distribution. Furthermore, and according to the National Electrification Strategy (NES), to achieve the universal access by 2030, an additional investment of US\$6 billion is required. Finance for these investments will be sourced from the IFIs and capital markets, including through PPPs. As set out in the NES, concessional and grant finance will be sought from multilateral and bilateral donors to increase access to social energy. The investments

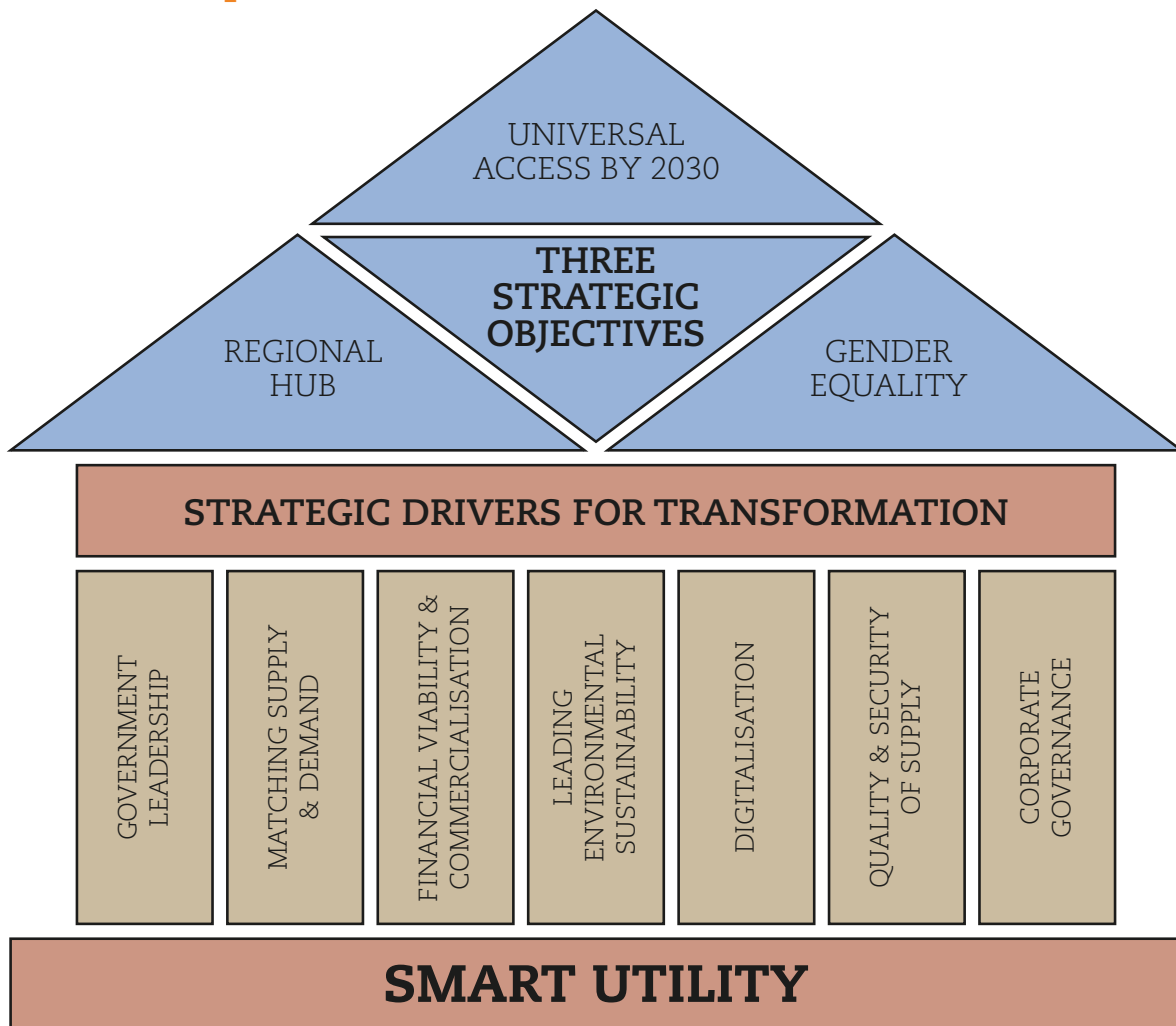
will also have to take account of the government's medium-term debt strategy and other scheduled public investment projects.

This can only be accomplished by ending business as usual.

In the last 25 years, Mozambique has added 400MW of power to its generated electricity supply. If we are to achieve the above vision, adding 15 times this amount over the next 25 years, we will need to act boldly and decisively.

The drivers to achieving EDM's three strategic priorities – the achievement of universal access to electricity, the establishment of Mozambique as a southern African energy powerhouse, the development of a model, smart utility epitomizing gender equality and managerial and operational excellence – are outlined below:

Promoting inclusion & development in Mozambique



- ▶ **Integrate EDM with the overall ambitions and institutions of Government:** EDM expects that the establishment of a new Government energy regulator ARENE (*Autoridade Reguladora de Energia*) will facilitate setting commercially sustainable (i.e. cost-reflective) tariffs. It is crucial that EDM financially ring-fence its social contribution to universal access so that this aspect does not undermine the utility's overall viability. Any price subsidies this entity might offer will have to be supported either by government revenue or donor financing. This is consistent with the proposals set out in the agreed NES. EDM is fully committed to playing a central role in setting up the new institutional framework.

'EDM's Strategy is to continue to maximise the regional market'

- ▶ **Ensure EDM's financial viability and commercial sustainability:** A financial restructuring plan has been developed by EDM, which will continue to be monitored and adjusted as required. This will deal with exiting arrears to suppliers, collecting outstanding bills, reducing technical and commercial losses and introducing improved financial and management information systems. It also includes process review and reengineering and budget and cost control to produce efficiency gains, and assumes the introduction of cost-reflective tariffs. EDM must become a financially healthy company able to attract the needed external finance, or it will not be able to successfully pursue the current Strategy, based on implementing major projects and ensuring the security of supply to Mozambique. There is a need to meet financial requirements specifically related to planned infrastructure projects. These requirements are likely to be met by a combination of loans, Government equity contributions and, to some extent, EDM's financial resources. To be able to raise necessary external funding from the capital markets, there may be a need for the Government to convert its existing loan guarantees to equity. This mix and the ability to access external funding will be critical. It is crucial that EDM adheres to

market principles, too, through making private participatory stakes available in both existing and future generation projects. This will ensure continued profitability and capital availability, while aligning EDM and HCB in their operational ethos and practice.

- ▶ **Matching Supply & Demand:** Increase the power availability and improvement of the system reliability through the implementation of the short-, medium-, and long-term investments identified in the Integrated MasterPlan (2017–2042). This aims to increase generation capacity, extend the grid and ensure security of supply. In the immediate phase, priority is given to increase generation capacity. In the subsequent phases, EDM will focus on transmission and distribution system bottlenecks hampering security of supply, mainly in the development corridors. Upon termination of the Mozal Supply contract with Eskom which comes up in 2025 and, in order to ensure reliable continuity of service, EDM will engage Mozal in Power Purchase Agreement negotiations.
- ▶ **Play a leading role in national and regional environmental sustainability:** As Mozambique's electricity generation is mostly based on renewables, it can play a leading role in the move towards cleaner energy and more flexible supply. At the same time it is highly vulnerable to the extreme weather effects of climate change, whether damage to infrastructure through flooding or the diminution of river flow, or water level at the dam. EDM will lead the environmental sustainability of Mozambique, through a strong commitment to balancing the national energy mix by minimising pollution levels and reducing CO₂ emissions.

'EDM must attract high-quality investment'

- ▶ **Digitalisation:** A digital revolution must play a central role in EDM's transformation into a smart utility. EDM's digitalisation, the improvement of the internal and external connectivity between EDM's business functions and its clients, and reformed processes and integration of new management systems will be key

enablers of this paradigm shift, towards the delivery of better services. EDM can be a shining example of state-owned enterprise reform in Mozambique.

- ▶ **Create security and quality of supply:** Increase power availability and improve system reliability through the implementation of the short-, medium-, and long-term investments identified in the Generation, Transmission and Distribution Master Plan (2017–2042). The investments aim to increase generation capacity, extend the grid and ensure security of supply. In the immediate phase, priority is given to increasing generation capacity. In the absence of a mature market, private sector participation in transmission is unlikely. In subsequent phases, EDM, therefore, will focus on transmission and distribution system bottlenecks hampering security of supply, mainly in the development corridors. Upon termination
- ▶ **Lead in applying corporate governance:** EDM must attract high-quality investment. For that purpose, it will not only adhere to Mozambique law pertaining to public utilities but will seek to lead in the application of international best corporate governance practices. Government will define the goals, the Board will set the Strategy and approve operational plans, and management will implement it and be held accountable by the Board. EDM will continue to review its organisational and governance structures to ensure that they are fit for purpose and respond to the changing dynamics in the industry. Development of a revised governance code and enterprise risk policy will be a priority.

Three Strategic Priorities

Three strategic priorities flow from these drivers:

- ▶ **Contribute towards the acceleration of universal access, in line with the Sustainable Development Goals:** The goal of universal access by 2030 is an enormous financial and institutional challenge. Achieving this goal requires cross-government coordination and cooperation, notably between MIREME, EDM and FUNAE. EDM's financial viability must be preserved in order for it to play such a role. This demands financial subsidies from other sources. The methods to achieve universal access are spelt out in the National Electrification Strategy.
- ▶ **Help Mozambique become a regional energy hub:** The SAPP accounts for 40 percent of EDM annual revenues. The regional market will grow. EDM will have the capacity to provide competitively priced electricity and flexible supply. EDM's Strategy is to continue to maximise the regional market through bilateral agreements with Botswana, Lesotho, Namibia, Swaziland and Zambia, and expand exports to Malawi, Tanzania, Zimbabwe and South Africa.
- ▶ **Ensure the development of sustainable human capital:** EDM is committed to the development and maintenance of a workforce skilled for the jobs of today and tomorrow, and to gender equality. EDM will not only ensure its own academy and infrastructure are an integral part of its long-term strategy for human capital development, but will work with and support national educational institutions to assist in the development of critical skills, especially in engineering.

EDM's Three Strategic Priorities

- ▶ The achievement of universal access to electricity in Mozambique.
- ▶ The establishment of Mozambique as a southern African energy powerhouse.
- ▶ The development of a model smart utility epitomizing gender equality and managerial and operational excellence.

Five Actions for Success

Leading the transformation demands performing five actions towards a fresh strategic approach:

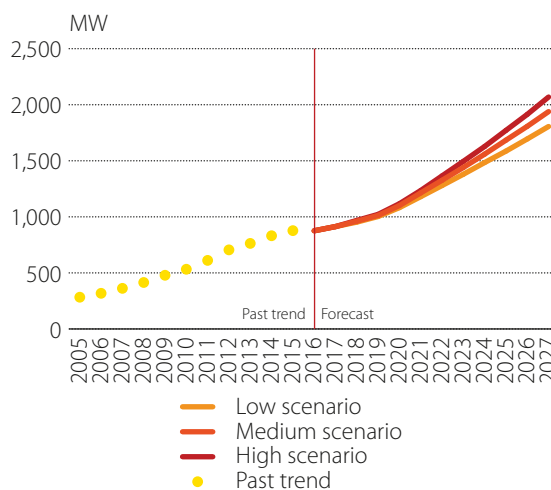
1. Increase Generation and Power Supply

This can be achieved in two ways:

► Increasing EDM's Power Share from HCB:

EDM should aim to negotiate an additional share in power from HCB. This should be tackled as soon as possible, focusing on inter-government relations and relations between the two state-owned electricity enterprises. EDM fully appreciates the importance of commercial imperatives to HCB's operations, without which it cannot invest in its own operations and meet its financial obligations. HCB also provides an important source of foreign exchange for the country. EDM aims to fund this increased share of HCB production through achieving greater domestic efficiencies, reducing losses and collecting arrears. State and local authorities cannot regard electricity as a free domestic service. Customers risk being cut off if a culture of non-payment persists.

Figure 9: Maximum demand – past and forecast



Source: EDM's Annual Statistical Reports vs Forecast

► Increasing Generation Capacity:

Mozambique's demand forecast for the upcoming years is based on assumptions from the Integrated Master Plan (2018–2043), which was updated from the previous Master Plan (2012–2027), and on indicators

including GDP and population data. Three scenarios – low, medium and high – were calculated. The base case scenario indicates that for 2018–2027 approximately 1,100MW is required (Figure 9).

Currently, Mozambique does not possess sufficient power generation capacity to sustain national and regional demand. There is already a deficit between demand and supply that will increase until 2022 due to the number of connections per year (residential customers) to comply with the intermediate targets in the National Electrification Strategy.

Cahora Bassa is the major generation source of Mozambique, with an installed capacity of 2,075MW, of which 1,500MW is committed to Eskom in South Africa under a long-term agreement, which terminates in 2029. As noted above, 500MW is taken for domestic market consumption, split 300MW to 200MW between firm and non-firm power. Viewed from a long-term national developmental perspective, the current tariff arrangement is not in Mozambique's best interest, since it exports energy at a lower rate than it imports or buys locally. Increasing the share supplied by HCB will decrease the cost of national supply, with major positive impacts likely for domestic businesses and job creation. To ensure HCB's continued viability, this can be achieved only if EDM pays for this electricity, and its customers pay EDM at a commercially sustainable tariff.

According to the generation expansion predicted in the Integrated Master Plan, the power shortage will persist between 2018 and 2022, necessitating the increase in supply. In light of such power supply needs, HCB can play a major role both in the short and long term of the national power system, particularly by providing an additional 200MW to EDM, contributing decisively towards achieving the goal of universal access by 2030.

2. Improve Efficiencies and Enhance Professionalism

EDM aims to improve its service delivery through a continuous programme of staff

development; technical and commercial loss reduction, process reengineering and improvement; customer focus and stakeholder engagement. EDM will continuously strive to improve efficiency and cost-effectiveness by applying technology and reducing recurrent and general operating costs. Management will operate according to commercial principles, in particular:

- ▶ **Staffing:** Improving performance through training interventions to fill competency gaps identified in personal development plans whilst actively promoting gender equality throughout EDM, shifting corporate culture to a performance culture, strengthening teamwork and using a management system that places a continuous emphasis on safety in the workplace. Detailed implementation plans are being finalised.
- ▶ **Technical losses:** Achieving network optimisation (optimal switching arrangements, balanced loading, and optimal voltage levels), along with reducing the cost of supply and the cost of generation and power imports.
- ▶ **Commercial losses:** Addressing non-technical losses in two ways. First, through improved organisation and process, by applying cost reduction processes and practices applicable to the various customer segments, particularly revenue protection and technical audits of high consumption customers. Second, through focusing on infrastructure and technology by implementing measurement infrastructure as well as intelligent measurement systems throughout the network (production, transportation and distribution) and full operation of the management information system (SIGEM) in all business areas.
- ▶ **Customer relationship management:** EDM must become increasingly focused on its customers. EDM commits to working hard to be respected by its clients and delivering excellent, customer-focused services. To do so, EDM will change the company's culture and behaviour, redefine commercial processes and adopt technology that will allow it to better manage, understand and communicate with clients. EDM understands that quality and reliability are just as important for SMEs as for large clients.
- ▶ **Community engagement:** EDM, in partnership with civil society associations, will seek to raise awareness and educate customers not to vandalise transmission and distribution assets, not to make clandestine connections, and to save on energy consumption by using, for example, energy-saving or low energy consuming bulbs. These partnerships will be extended to the promotion of civic educational campaigns in schools, neighbourhoods and places where there are large commercial losses of electricity, thus bringing EDM closer to its customers and reducing conflicts. Furthermore, a communication strategy will be developed to engage and inform the stakeholders and shareholders about the main processes and achievements in the company.
- ▶ **Improving connectivity:** A National Control Centre must be established in the short term to ensure that the upcoming projects in generation, transmission and distribution will have a proper tool for operation and dispatch. Mozambique does not control supply and demand. The connectivity strategy, as defined by EDM's Information and Communication Technology (ICT) strategy, is customer-centric, real-time, agile and flexible, aiming at a holistic and integrated visualisation of EDM's business processes, data and technology solutions. Transmission lines, including optic fibre, are a priority, as the two sectors can be served by ICT. This is more evident in smart grids, where there is a close integration of electricity generation, transmission and distribution through ICT. This therefore warrants that the planning of transmission lines be synergised with ICT infrastructure, as both can use the same routes and lines.

3. Operate with Cost-Reflective Tariffs

EDM will work closely with the new regulatory authority, ARENE, to establish tariffs that reflect both current and future costs in a transparent way. Tariffs are crucial to the sustainability of the national electrical system. As the main

source of revenue, the tariff level should aim to adequately cover the operational costs and endow EDM with the capacity to make future investments. The most vulnerable customers will continue to benefit from social tariffs as set out in the NES. According to the Integrated Master Plan, the power tariff should increase from 2018 to 2021 to reach the level of cost recovery. From 2022 the power tariff will be inflation-linked. ARENE's scope of responsibilities will encompass participating in the planning process, setting standards and quality requirements and proposing and approving a tariff structure for electricity prices in order to maintain the power sector's financial sustainability and promote 'free competition' in energy services.

4. Promote Infrastructure Development

EDM must closely integrate with the broader national policy investment framework to ensure this Strategy's successful implementation. Specifically, as the national public utility, EDM will promote the development of power generation and system infrastructures, through a corporate finance model. In partnership with the private sector, EDM will promote and support the IPPs' investment. It will support the development of the transmission corridor to connect Mozambique's northern central and southern systems and the wider SAPP network, the backbone of which will be the *Sistema Nacional de Transporte de Energia* (STE) system. EDM's investments will be driven, too, by the following additional considerations:

- ▶ **Energy mix:** Mozambique has been blessed with abundant primary resources, and most of them remain unexplored. EDM will support efforts to boost the supply of power from various sources to diversify the supply and meet future demand projections.
- ▶ **Gas to power:** EDM will contribute to discussions about the best use of Mozambique's proven gas reserves, and the further investments required for converting gas to power. The Government has a clear plan to use natural gas, its priority being fuel production, gas to power and fertilisers. Allocating gas by the Government is based on auctions, except that the price of gas for generating electricity is the lowest sufficient to recover the minimum cost of production and transportation to the generation sites. Based on this, EDM has already obtained gas for the development of CTM1 (106MW), CTM2 (106MW), Temane (400MW), and Temane (106MW).
- ▶ **Hydro:** EDM will concentrate its efforts on the development and implementation of Mphanda Nkuwa, Tsate, Borama and Lupata to maximise the potential from hydro. EDM will also explore the existing watersheds for the development of more hydro power stations, whenever possible combining hydro power with irrigation systems.
- ▶ **Renewables:** Climate change has underlined the need to diversify the sources of energy, especially green energy and renewables and to take advantage of the rapid cost reductions from technical advances in solar power. EDM will develop a strategic plan for renewable energy, prioritising an integrated approach on and off the grid to achieve universal access by 2030. Based on the guidelines defined in the Integrated Masterplan and National Electrification Strategy, EDM is engaged in developing a strategic plan for the following renewables sources: solar photovoltaic, wind, geothermal, biomass and mini hydro. Mocuba and Metoro will be EDM's pioneer projects for correct integration of renewables with the national grid, increasing the share of renewables in the energy mix. Simultaneously, EDM will develop commercial off-grid systems for remote areas to allow a productive end-use of energy consumption in order to boost the national economy, in particular the agriculture, tourism, mining and industry sectors.
- ▶ **Coal:** Mozambique has some of the largest reserves in the world (23 billion tons of proven coal reserves) which can provide an economically efficient power supply whilst using new technologies to reduce emissions levels. Cooking coal is exported overseas, while thermic coal remains unutilised as a power source. Current reserves correspond to a 2,000MW generation capacity. EDM, during the next decade, will develop the

following projects: Nacala (200MW), Cuamba (300MW) and Tete (600MW).

- ▶ **Own generation:** Although the revenue stream of EDM has grown quickly and steadily, reaching US\$410 million in 2016 due to exports, EDM still has an operating deficit and is saddled with considerable inherited debt. Based on the current financial constraints, to increase own generation and transmission systems, EDM will concentrate its effort on the development of its own medium-scale generation projects (50–100MW) with the support of international financial partners using donor funds and concessional loans. EDM will develop under this category CTM phase 1 (106MW), Temane (106MW), CTM phase 2 (106MW) and Tsate (50MW).
- ▶ **Attracting private sector investment:** EDM will take a minimum of 25 percent equity in private–public partnerships (PPP), allowing a decrease of tariffs and increase in returns, which in turn will allow it to negotiate better terms for further financing. The projects to be developed under this category are Temane (400MW), Mphanda Nkuwa (1500MW), Nacala (200MW), Cuamba (300MW) and Tete (600MW). Other projects, as listed in tables A1 and A2 in the Appendix, shall be developed using IPPs. The Government will launch auctions to select new IPPs to develop the projects already identified in the Master Plan, with the aim of attracting credible investors and ensuring the lowest possible tariffs.

Of course, generation plants cannot work in isolation so transmission assets will need to be built. The current model will still need to be pursued, whereby EDM obtains funds from donors, multilateral institutions and bilateral partners. In special cases, where the end-client benefits from the construction of the transmission line, the private sector will be granted permission to build. The system should have a unique, state-owned and single operator in EDM. Private companies shall not be allowed to manage and operate the national transmission grid, as stipulated by Decree No. 43/2005. This restriction is also

applied to the STE, to be built under PPPs during the current decade, to transmit power from Temane, Mphanda Nkuwa and other generation plants along the Tete-Maputo Corridor.

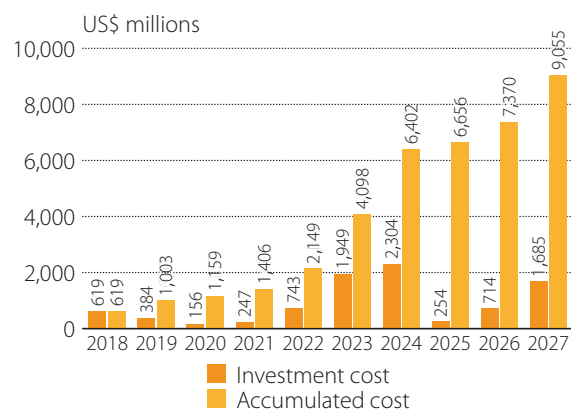
- ▶ **EDM project finance vehicle:** EDM proposes to form a company – EDM Investment (EDM I) – which will deal with all generation projects done with IPPs as well as some special transmission projects. EDM does not currently possess the financial means to develop all the projects on a corporate basis. Projects are to be developed on a project–finance basis through stand-alone investments whereby debt and equity used to finance the project are paid back from project revenues. This will reduce pressure on EDM’s current balance sheet. EDM will need to contribute equity of some US\$2.5–3 billion, secured from commercial borrowing or IFI lending. Guarantees can come from Government or project sponsors, or by pledging EDM’s existing assets. This will provide resources to develop large projects, professionalise equity financial participation in projects developed on a project–finance basis and capitalise and establish robust balance sheets for the energy sector, capitalising on EDM’s existing asset base. To accomplish this, EDM will require, step by step, to establish a new corporate structure; transfer assets and projects from existing holding companies to the new vehicle EDM I and mobilise capital based on cash flow of existing assets and projects, thus capitalising the new vehicle. EDM I can also obtain bridge loan facilities that can be repaid through returns from the existing holding companies (CEZA, Motraco, CTRG, Temane, Mocuba and other future projects where EDM has equity participation).

Ownership of electricity assets does not determine their value to Mozambique; that will be established by their output and contribution to transforming the lives of Mozambicans.

For the period 2018–2027, development of generation capacity of around 4,172MW is expected

Table 2: Generation capacity development
MW

Year	Hydro	Gas	Coal	Solar	Wind	Total	Description
2018	–	106	–	40	–	146	CTM, Mocuba
2019	–	–	–	40	–	40	Metoro
2020	–	–	–	–	–	–	
2021	–	–	–	–	–	–	
2022	–	400	–	–	–	400	Temane
2023	–	206	–	–	–	206	Temane (100), CTM2 (106)
	–	–	650	–	–	650	Jindal (150), Nacala (200), Tete1 (300)
	–	–	–	–	30	30	Tofo
	–	206	650	–	30	886	
2024	1,500	–	–	30	–	1,530	Mphanda Nkuwa
2025	50	–	–	30	–	80	Tsate
2026	–	–	300	30	–	330	Tete
2027	650	80	–	–	30	760	Boroma e Lupata
Total	2,200	792	950	170	60	4,172	

Figure 10: Generation investment cost, 2018–2027

Source: Integrated Master Plan 2017–2042

5. Define EDM's Role in Universal Access

EDM must play a leading role in improving access to power for all Mozambicans, especially in the rural areas, by mobilising donor funding for social investment in universal access and ensuring the ongoing commercial viability of its own activities.

EDM will not try and should not do everything, but, as the major driver in national electrification and with its experience and

capacity it will have responsibility for developing and implementing a set of projects within a national plan to connect a minimum of 300,000 to 450,000 new customers annually from 2018 to achieve about 85 percent domestic access to electricity in 2028.

FUNAE will also have an important role in national electrification. It will build non-commercial (less than 1MW) off-grid infrastructure and transfer it, once commissioned, to EDM to operate. Respective roles and

responsibilities are being clarified. EDM will continue to act as a central player in supporting MIREME in planning and in ensuring institutional coordination to achieve the Government of Mozambique's goal to provide universal access by 2030.

EDM will engage the private sector in establishing factories for electrical equipment, thus accelerating universal access and contributing to the reduction of electricity tariffs.

Achieving universal access will require wholesale changes in EDM's operations, logistics and systems. EDM should be responsible for overall project management and commissioning, and it will need to recruit and retain additional technical resources. EDM should be responsible for more complex design

procurement and system issues. It must establish guidelines for the selection and prioritisation of projects and put in place new procurement strategies for standardisation and bulk purchases so that implementation can be contracted out.

Securing the necessary financing for such ambitious targets will be very challenging. Mozambique's level of indebtedness is likely to remain high through the mid-2020s, which could reduce the prospects for new loans, including for the electricity sector. If the necessary funding cannot be found by existing means or through changing financing or the equity mix between public and private sources, different and possibly less ambitious access targets will have to be sought.

Strategy Implementation and Results Monitoring

EDM is focused on delivery of key assets alongside growing its revenue, improving its assets, personnel efficiencies and responsiveness, and increasing its return to its shareholders – the people of Mozambique. This delivery can be measured in terms of the following matrix. To ensure the Strategy's success, EDM will create a Delivery Project Measurement System (DPMS). Aligned with the main strategic goals, Key Performance Indicators (KPIs) must be defined as the benchmarks of the DPMS, allowing thus an effective and regular assessment of the Strategy's progress and need for adjustment.

Resourcing the strategy

Staffing

EDM's transformation will be powered by its people. In order to successfully implement the stated goals in the 10-year strategy, a new culture based on performance and proactivity will be critical. EDM's workforce will require a combination of

strong technical and leadership skills to maximise productivity and drive efficiency over the longterm.

Finance

The financial estimate to increase generation, transmission and distribution capacity to meet the goals defined in the masterplan is around 17,800 MUSD in a decade. Of this amount, 9,055 MUSD will be required to finance generation projects, 6,118 MUSD for transmission projects and 2,630 MUSD for distribution projects. Finance for these investments will be sourced from the IFIs and capital markets, including through PPPs, a part of EDM's revenues, equity, capital increase and adequacy. In addition, an EDM project finance vehicle (EDM Investment) will be created, consistent with Government's broader national investment framework and in consideration of its medium-term debt strategy, using existing subsidiaries companies such as CEZA, CTRG, Motraco.

Additionally, to meet the universal access targets over the next decade the total amount of access investment in the Non-OEA (non obligation expansion area) is 4,394 MUSD, from which 3,259 MUSD will be funded by the IFIs, 1,086 MUSD from grants and 49 MUSD provided by the Government.

Result monitoring

EDM's Metrics Matrix

Strategic Goals	Objectives	Strategic Initiative	Targets
Quality and Security of Supply	Expand Generation and Transmission Infrastructure Capacity	CTM1 (106MW) to come on stream	Short term (1–3 years)
		Solar-plants of Mocuba (40MW) to come on stream	Short term (1–3 years)
		EDM integrated masterplan roll-out	Short term (1–3 years)
		PERIP and emergency project implementation	Short term (1–3 years)
		Cuamba (300MW) coal-fired to come on stream	Medium term (3–5 years)
		Completion of solar-plants Metoro (30MW)	Medium term (3–5 years)
		Temane (106MW) to come on stream	Medium term (3–5 years)
		CTM2 (106MW) to come on stream	Medium term (3–5 years)
		Maputo to Temane transmission project (400kV)	Medium term (3–5 years)
		Nacala plant completion (40MW)	Medium term (3–5 years)
		Completion of wind-plant Namacha (120MW)	Medium term (3–5 years)
		Mphanda Nkuwa hydro (1,500MW) on stream	Long term (6–10 years)
		Tsate hydro (50MW) on stream	Long term (6–10 years)
		Caia–Nacala transmission line completion (400kV)	Medium term (3–5 years)
		Lupata and Boroma hydro (650MW) on stream	Long term (6–10 years)
Backbone completion from Mphanda Nkuwa to Temane	Long term (6–10 years)		
Regional Hub	Regional Integration	Malawi–Mozambique interconnection completion (400kV)	Medium term (3–5 years)
		Mozambique–Zambia interconnection completion (400kV)	Medium term (3–5 years)
		Mozambique–Tanzania interconnection completion (400kV)	Long term (6–10 years)
		Mozambique–Zimbabwe–South Africa (MOZISA) (400kV)	Medium term (3–5 years)
	Energy Protocol	Harmonise national and regional policies	Short term (1–3 years)
		Cooperate in the development of energy pooling for low-cost technologies	Short term (1–3 years)
Transform EDM into a Smart Utility	Make EDM Digital	Stabilise IT applications and develop service orientation	Short term (1–3 years)
		Improve connectivity of EDM and installations	Medium term (3–5 years)
		Adopt and develop ICT Governance policy and tools	Short term (1–3 years)
		Build and operationalise EDM digital	Medium term (3–5 years)
		Assess national grid capacity/requirements for connection of renewable energy plants	Short term (1–3 years)
		Meter factory to be established	Short term (1–3 years)
		National Control Centre	Medium term (3–5 years)
		Develop EDM telecommunication strategy including potentially commercialising excess capacity of EDM national IP/OPGW	Short term (1–3 years)

Strategic Goals	Objectives	Strategic Initiative	Targets
Corporate Governance	Reform the Organisation	Implement shared services and tools for people and organisation management	Short term (1–3 years)
		Complete re-organisation and staff mapping	Short term (1–3 years)
		Create the workforce of the future	Medium term (3–5 years)
		Develop and implement a delegation of authority matrix	Short term (1–3 years)
		Develop a clear and explicit governance policy	Short term (1–3 years)
		Create its own corporate governance code	Short term (1–3 years)
		Develop enterprise risk management	Short term (1–3 years)
		Complete procurement reform	Short term (1–3 years)
Human Capital Development	Establish the Knowledge and Technology Center	Refurbish and launch the Vocational Academy	Medium term (3–5 years)
		Identify and implement vocational and professional priority programs	Medium term (3–5 years)
		Develop a new learning strategy	Medium term (3–5 years)
		Structure archives unit	Short term (1–3 years)
	Professionalise EDM Corporate	Improve workers' health	Short term (1–3 years)
		Implement best practices on occupational health	Medium term (3–5 years)
		Environmental hazards management	Short term (1–3 years)
		Widen training and community engagement programs	Short term (1–3 years)
		Apply for occupational health and safety certification on OHSAS 18001	Medium term (3–5 years)
		Attain Gender Balance	40 percent Gender Index by 2030
Leading Environmental Sustainability	Climate Change in Overall Energy Planning	Ensure that clean energy infrastructure projects have a carbon revenue element	Short term (1–3 years)
		Adopt low carbon development path	Short term (1–3 years)
Financial Viability & Commercialisation	Ensure Financial Sustainability	Operate with cost-reflective tariffs	Medium term (3–5 years)
		Improve budgeting, budget monitoring, control and reporting process (capital and operating expenditure)	Short term (1–3 years)
		Strengthen the balance sheet; increase share capital through debt-to-equity conversion by government.	Short term (1–3 years)
		Attain better financial autonomy through improved debt service	Medium term (3–5 years)
		Liquidity ratio above 1:1; coverage ratio of debt service above 4; solvency ratio above 1	Medium term (3–5 years)
		Ensure 100 percent coverage of pre-paid meters	Long term (6–10 years)
	Meet Financial Requirements	Establish a pension fund with financial autonomy	Medium term (3–5 years)
		Develop and implement a funding strategy	Medium term (3–5 years)
		Investor road shows	Medium term (3–5 years)
		Secure Government support	Short term (1–3 years)

Strategic Goals	Objectives	Strategic Initiative	Targets
Government Leadership	Regulatory Framework	Coordinate the production of the cost-reflective tariff with ARENE	Medium term (3–5 years)
		Operationalise National Energy Regulator	Medium term (3–5 years)
		Participate in the MIREME Strategic Plan elaboration and implementation	Medium term (3–5 years)
	Energy Policies	Adopt Private Management Sector	Short term (1–3 years)
		Lead energy policy implementation	Medium term (3–5 years)
Universal Access	Commercial and Social Energy	Develop short-, medium- and long-term generation, transmission and distribution projects for enabling connections	Short term (1–3 years)
		Mobilise donor funds to develop social energy projects	Short term (1–3 years)
		Map the most cost-effective technologies for connection to various consumers	Short term (1–3 years)
Matching Supply and Demand	Energy Efficiency	Ensure introduction of energy audits are mandatory	Medium term (3–5 years)
		Work with Government to ban the importation and retailing of incandescent lamps	Medium term (3–5 years)
		Reward policies for energy efficiency and energy conservation	Medium term (3–5 years)
	Renewable Energy	Study the market for various technologies	Short term (1–3 years)
		Launch auction of renewable energy	Short term (1–3 years)
		Develop appropriate tariff regimes for different renewable energy sources	Short term (1–3 years)

Conclusion: Tough Choices to Empower Mozambique's Transformation

Imagine a Mozambique where its bountiful natural resources can be mined and exported to the world as finished products, leaving through highly-mechanised ports operating at maximum capacity. Imagine an environment where Mozambique is a market leader in African tourism, with *Ilha de Moçambique* at its cultural epicentre. Imagine a country that not only produces more foodstuffs than it consumes, but fully processes the foodstuffs it exports. Imagine an economy where Mozambique's citizens enjoy full employment, where the studies of young men and women are not interrupted by nightfall, and where digital access and integration are the norm. Imagine a Mozambique where even with full domestic electricity access, excess power is exported to the region, enabling economic growth in southern Africa to reach unsurpassed levels.

That is to imagine an EDM at the centre of Mozambique's transformation, investing for the next generation in electricity generation and transmission projects, constantly seeking to bring down costs and improving its service efficiencies.

To achieve Mozambique's national development goals, we must aim for long-term development, but

act with alacrity. We must guard against vested interests and bureaucratic inertia. We must act now to build a better tomorrow so that our third transformation from poverty to prosperity will become a reality.

Some tough immediate choices will have to be made to realise this positive future, including the need to:

- ▶ Select long-term development requirements over short-term impulses.
- ▶ Ensure that economic good sense prevails in the people's interest.
- ▶ Carefully balance the need for income from foreign sales of electricity with support for the growth of local consumers.
- ▶ Set commercially viable tariffs to ensure the long-term sustainability of EDM and the growth of capital projects.
- ▶ Select quality and reliability of supply over cheap cost.
- ▶ Seek investment and development before ownership.

If Mozambique makes these choices wisely, a bright future lies ahead.

Appendix: EDM SWOT Analysis

EDM OPPORTUNITIES	EDM CHALLENGES
<p>STRENGTHS</p> <ul style="list-style-type: none"> • Main driver of Mozambique's power sector. • National presence. • Energy growth potential. • Energy mix: hydro, gas, coal, renewables; on-grid and off-grid. • EDM's historical knowledge of the power sector. • Southern African Power Pool presence. • Domestic demand less than available capacity. • IPP/private sector power presence. 	<p>WEAKNESSES</p> <ul style="list-style-type: none"> • Rural coverage, cost and access. • High levels of EDM debt. • Poor network infrastructure. • High losses – technical and 'non-technical'. • Efficiency – demand and supply management. • Need for financial provision for social energy. • Absence of cost-reflective tariffs. • Weak institutional framework. • Regional fiscal environment. • Fluctuating demand domestically and regionally. • Absence of commercial underpinnings.
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • EDM platform for expansion and growth. • Energy mix and potential – especially gas. • Regional demand/integration. • Expansion to remaining two-thirds of society. • Mozal expansion. • Population growth. • Increasing urban concentration. • Low access. • Feed domestic industrialisation and growth. • Private sector skills, interest and investment. • Power as mechanism for social goods. 	<p>THREATS</p> <ul style="list-style-type: none"> • Debt. • Economic instability and government default. • Regional default on debt. • EDM default on debt. • High cost of universal access. • Mozal. • Fluctuating regional demand and opportunities. • Mozambique's population growth rate. • Reliance on Cahora Bassa.

Strengths

HCB: The Mozambican power system has been heavily influenced by the development of the Cahora Bassa hydropower facility, which primarily sells power to South Africa, with Mozambique taking some for its own consumption. Most of this power is exported to Eskom, but 300MW of firm power and 200MW of non-firm power are made available to EDM. The plant commenced operations in 1977. Two 533kV high-voltage direct current (HVDC) lines were built from this region to South Africa – but no connection was built through Mozambique to its southern region. To this day, power to the Maputo region from Cahora Bassa is still delivered from South Africa.

Energy growth potential: Mozambique has abundant natural resources, including gas and coal, and renewable sources (such as hydro, solar, wind, biomass and geothermal) with enormous

power generation potential. The country has one of the largest hydropower potentials in Africa (the Zambezi River alone is capable of generating 18,000MW), and Cahora Bassa is one of the largest installations in Africa, with an installed capacity of 2,075MW. There are more than 1,400 projects identified to increase the country's generation capacity – Mphanda Ukuwa's 1,500MW project being the major priority to develop over the next ten years. Regarding solar, Mozambique has high volumes of solar radiation, in particular in the provinces of Tete, Niassa, Nampula and Cabo Delgado, with a potential to generate 23TW. The Pande and Temane gas reserves are 3.5 trillion cubic feet, and in Rovuma Basin gas reserves are 128 trillion cubic feet, enough to export Liquefied Natural Gas (LNG), but also to use gas to develop combined cycle power plants to increase the generation capacity. The 20 billion tonnes of coal are another possible source for supporting and boosting generation under a least-cost plan approach.

All these resources and characteristics endow the country with many options to diversify the sources of generation, increase the security of supply and attract foreign and private sector investment. A least-cost plan can be developed to provide competitive energy to boost electrification and feed industrialisation.

EDM's historical role: EDM is a critical stakeholder in the Mozambican power sector. The company has mobilised both public and private financing over the years to expand access and increase service and is mandated to supply the country with electricity for an indefinite period. It is not only leading the electrification effort but also funding it. Further, Decree 42/2005 makes it the designated manager of the Mozambican grid. In short, its control over generation, distribution, commercialisation and import and export make it indispensable. Given its intimate and historical knowledge of the sector, EDM is also well placed to advise and build the capacities of power sector players, most recently supporting MIREME on project planning and prioritisation and standards and performance indicators for CNELEC. It has a competitive portfolio and, until recent years, was operating on a financially sustainable basis.

IPP/private sector power presence: According to the Electricity Law of 1997, the private sector was legally allowed to invest in generation. However, in practice the first IPPs only came to invest in 2014, due to the Government and EDM's weak financial capacity to develop major generation projects. EDM has the mandate to supply electricity in Mozambique and is the only entity in charge of the national transmission grid and able to perform the system and market operation role, which means that in this model, EDM is the only purchaser of the energy generated by the IPPs. Since 2014, IPPs have developed on-grid private generation projects, in particular, the 175MW gas-fired *Central Térmica de Ressano Garcia* (CTRG) power plant commissioned in 2014, the 100MW gas-fired Gigawatt power plant commissioned in 2015 and the 40MW gas-fired Kuvananga power plant commissioned in 2017. These projects expanded national generation to meet the needs of increasing access and economic

activity, and also revealed the private sector's appetite for Mozambique's energy resources. For the next years more IPPs are expected to come on board. For example, the ACWA 300MW coal-fired power plant in Moatize and the solar power plants of Mocuba (40MW) and Metoro (30MW) that will contribute to the diversification of the national energy matrix.

Weaknesses

Rural coverage, cost and access: Mozambique is a vast territory with approximately 5 million households and more than 27 million people, 68 percent of whom live widely dispersed in rural areas, making the national electricity grid extension extremely difficult. Despite a significant evolution from 2001 until 2017, the electrification rate increased from 5 percent to 27 percent. Mozambique still has one of the lowest electrification access rates in Africa. However, the Government and EDM are fully committed to reaching the universal access target by 2030. The electrification of rural areas will be a big challenge because building the required on- and off-grid infrastructure to supply remote villages across the country means a large investment to supply a population with low incomes, who will not be able to pay cost-reflective tariffs, making this service not an economically viable business model.

EDM's debt: Across the continent, African governments on average spend US\$21 billion annually, bailing out loss-making utilities. As EDM is the main power-sector stakeholder in Mozambique, ensuring its financial solvency is of paramount importance. EDM is currently a loss-making utility, and plans for the future will place increasing pressure on the utility's ability to operate. Likely scenarios could include declining financial performance due to principal and interest repayments on loans, over-reliance on EDM to expand and maintain critical power sector infrastructure, and minimal growth in sales thanks to subsidised (that is, not cost-reflective) tariffs, among others. EDM faces severe constraints given its growing debt (upwards of US\$1 billion). A key problem is EDM's

inability to continue the much-needed expansion of transmission and distribution infrastructure, while continuously operating at a loss. Other constraints include problems in accessing capital in a time of macro-economic volatility and low investment appetite in the private sector for the energy sector. A further constraint to capital would be IFIs' likely decision and advice to divert loans (at less competitive rates) from EDM to the country's proposed Electrification Account.

Financial provision for social energy: Currently it is EDM that finances and sustains commercial and social electrification projects, without Government subsidies or budget support. To achieve the universal access by 2030, it is necessary to connect the vast portion of the population (68 percent) that lives widely dispersed in rural areas. Many electrification projects are not viable, and a large amount of capital is necessary. At the moment, EDM's financial situation is not sustainable, and the tariffs do not reflect the cost of electricity service, making it impossible to meet universal access by 2030 without a proper funding scheme.

Cost-reflective tariffs: Between 2015 and 2017, the electricity tariff in Mozambique increased three times but still did not match the cost of energy, which had climbed as a result of the IPPs coming on stream to deal with the shortages of energy. The social tariff was preserved, which resulted in EDM subsidising such tariffs to poor residential customers. Despite recent tariff adjustments, EDM retains selling power and is operating at a loss without any subsidy, a strategy that is unsustainable. EDM has generation capacity from HCB, own-generation and IPPs. HCB's power is being sold at very low prices below the costs of supply. With no regulatory body to establish thresholds for the tariffs, EDM has negotiated directly with the Government and signed PPAs with IPPs, which resulted in high wholesale cost of electricity to EDM of 8.5 US cents (*Ressano Garcia*), 11 US cents (*Gigawatt*) and 13 US cents (*Mocuba and Metoro*). This placed a big burden on EDM and contributed negatively to EDM's balance sheet.

Domestic poverty and ability to pay: In Mozambique, rampant poverty and vulnerability to external shocks, high from both climate change and macro-economic volatility, are set to continue over the intermediate term. GDP per capita sits at US\$600 (2016), and half of the population is below the World Bank-defined poverty line of US\$1.90 per day. Of further consequence, the vast majority of Mozambique's population live in rural areas, which are poorly served compared with urban centres. The combination of low incomes and poor service provision directly affects end-users' willingness to pay, necessitating lower tariffs. This makes reconciling the actual costs of connections and energy provision (cost-reflective tariffs) with affordability to the households problematic, risking the long-term financial sustainability of the power sector.

Weak institutional framework: The institutional framework is weak, which naturally affects the dynamics of the entire power sector, in particular, EDM's role. The main actors of the institutional framework are the Ministry of Mineral Resources and Energy (MIREME), CNELEC (future ARENE, a body that provides advice and mediation regarding energy sector regulation policy and concessional issues), EDM and FUNAE. Currently, due to a lack of capacity, there is no entity responsible for performing integrated, coordinated planning and monitoring, which in normal conditions should come from MIREME. Such responsibilities are essential tasks in interpreting the Government's vision and policies and defining the best path to achieve the defined goals. A regulatory entity is fundamental to promoting fair competition among the key players and ensuring the financial health of the sector. CNELEC has some consultative regulation responsibilities but no power or capacity to perform such a role. The absence of regulation in the Mozambican power sector impairs the definition of the electricity tariffs, which are not cost-reflective, leading to discrepancies on energy purchase contracts with the IPPs, harming EDM's financial health.

Corruption: Corruption is a key impediment to economic transformation and is often linked to

poor governance across Africa. Having the right institutions and institutional frameworks in place is critical to minimising the impact of corruption. In Mozambique, creating an independent power sector regulator will be an important way to build transparency and incentivise the accountability of power sector stakeholders, including the Government. Transparent procurement processes, too, are important – curbing the award of contracts on political grounds as well as reducing the cost of energy by incentivising increased competition.

Opportunities

Expanding access: In order to achieve universal access in 2030, Mozambique must more than triple the total number of customers. This huge expansion will mean a significant change in people's and in households' life because it will allow access to illumination, better health and working conditions, telecommunications and new ways of ensuring productive activity.

Cahora Bassa: Despite selling 1,330MW to Eskom until 2029, HCB is still the major asset of the national power system and has sufficient electrical output capacity to meet current domestic demand. The role and contribution that HCB could contribute to the future power system, in particular the possible implications and benefits of the reversion of the power to Mozambique in 2029 or an increase in Mozambique's share before then should be analysed, as well as potential changes to the Mozal aluminium smelter agreements. Such changes may affect financial and project prioritisation, generation mix, the use of gas to power, and other aspects.

Mozal/Motraco: Mozal SA aluminium smelting company is the major electricity consumer of Mozambique, with a demand of 950MW, more than the entire national domestic market. However, the electricity that feeds Mozal must be imported from South Africa under a long-term agreement, which ends in 2025, because currently, EDM does not have the capacity to provide the required 950MW. To supply the required electricity, in 1998 the

Mozambique Transmission Company (MOTRACO), an independent transmission company owned by EDM, Eskom and SEC (the Swaziland utility), was established. The expiration of the long-term electricity contracts between Eskom and Mozal in 2025 and Eskom and HCB in 2029 could open a window of opportunity for a further 1,500MW becoming available to, eventually, feed Mozal. However, for this purpose, the national transmission system has to be prepared to supply reliable and quality power required by the Mozal operation.

Population growth: The United Nations projects Africa's population to double from 1.2 billion now to 2.5 billion in 2050 and 4.5 billion by 2100. Such extreme poverty – measured by the number of people living on less than US\$1.90 per day – is expected to continue to increase, from 400 million today to 525 million by 2050. Governments need to plan for the future and not just react to the present. Energy provision is a key driver of development. If Mozambique were able to expand access to electricity, it would be better able to take advantage of a burgeoning young population and labour force. This means unlocking opportunities by integrating productive end-use criteria for energy, both present and projected, into sector planning. A mapping exercise to identify current sites of economic activity – particularly small-scale agriculture – could help facilitate energy access planning that also boosts economic productivity and inclusive growth over time.

Leveraging domestic economic growth: Leveraging domestic industrialisation and agriculture to modernise and diversify the national economy is among the priorities and strategic objectives contained in the Programa de Quinzenal de Governo 2015–2019. The current industrial development environment is formed by a combination of private sector initiative and public sector licensing. The strategies defined by the Government identified the private sector as a key driver to implement economic transformation, and such Government measures as establishing industrial free zones and special economic zones in Beira and Nacala attracted foreign investment. Mozambique has enormous potential in agriculture (maize, cassava,

cowpea, groundnut, cashew, cotton, tobacco, and so on), and the country is rich in mineral resources (such as gold, graphite, gas, coal, heavy sands, and gemstones), generating several memoranda of understanding between the Government and private companies. Energy-dependent companies (industry, mining, agro-industry) offer a major opportunity to boost the country's electrification because they bring financial capacity to secure funding and to pay for energy. However, an integrated and cross-sector approach should harmonise and optimise service to industry and to the population. Priority in planning generation should follow the least-cost option in order to have sustainable energy tariffs that can be competitive and support the development of industry and agriculture.

Energy mix, priorities and sequencing: Mozambique has been blessed with abundant primary resources and most of it remains unexplored.

Threats

Economic (macro and national) instability and Government default: Since 2014, Mozambique has faced an economic downturn due to low commodity prices; the risk of conflict; drought; and the discovery of hidden debts. Illicit credits revealed in 2016 deteriorated the confidence of the country's partners and generated mistrust among creditors and investors, particularly about the country's capacity to repay loans, exacerbated by the country's default in missing a second coupon payment on the sovereign bond. From 2015 to 2016, the debt exploded, increasing in one year by 25.47 percent and reaching 113.58 percent of Mozambique's GDP. The negative outlook and uncertainty in Mozambique generate a lack of confidence in the financial institutions. Capital inflow into the country is reduced, with unfavourable lending rates adding to the lack of liquidity created by depreciation of the currency, low investment, and a tight budget. All of these negatively affect EDM.

High cost of universal access: Mozambique is a vast territory with approximately 5 million households and nearly 29 million people, 68 percent of whom live widely dispersed in rural areas, making extension of the national electricity grid extremely difficult. Some expansion is costly and non-viable due to remote locations. Mozambique still has one of the lowest electrification access rates in Africa. However, the government and EDM are fully committed to meeting the universal access target by 2030, even though electrifying the whole country will be a huge challenge, not least given the precarious financial situation of both Mozambique and EDM. The cost of universalisation will necessitate the injection of a vast amount of capital, not only to improve the distribution system and increase the number of connections to meet the 2030 target but also to improve the capacity of the transmission system.

Population growth and urbanisation: Population growth is an opportunity but also a threat. As the population rises, demand grows for power both for personal consumption and for service provision, which rely on a steady supply. Population growth particularly affects under-connected and under-serviced rural areas and will continue over the immediate to long term, while urbanisation grows 3.36 percent a year.

Cahora Bassa: HCB is 92.5 percent owned by EDM but has signed up to sell 70 percent of its power to the South African public utility, Eskom, which is paying approximately 2.5 US cents/kWh, while Mozambique is paying on average 9.5 US cents/kWh through other sources. The majority of the power that returns to Mozambique is to supply Mozal, the aluminium smelter. Not transferring the power supply from Cahora Bassa to Mozambique in 2029 may have serious implications for Mozambique's power sector, because purchasing power from HCB at 1.5 US cents/kWh or even at the same rate Eskom pays is far cheaper than any alternative.

Figure 11: EDM's Electricity Infrastructure

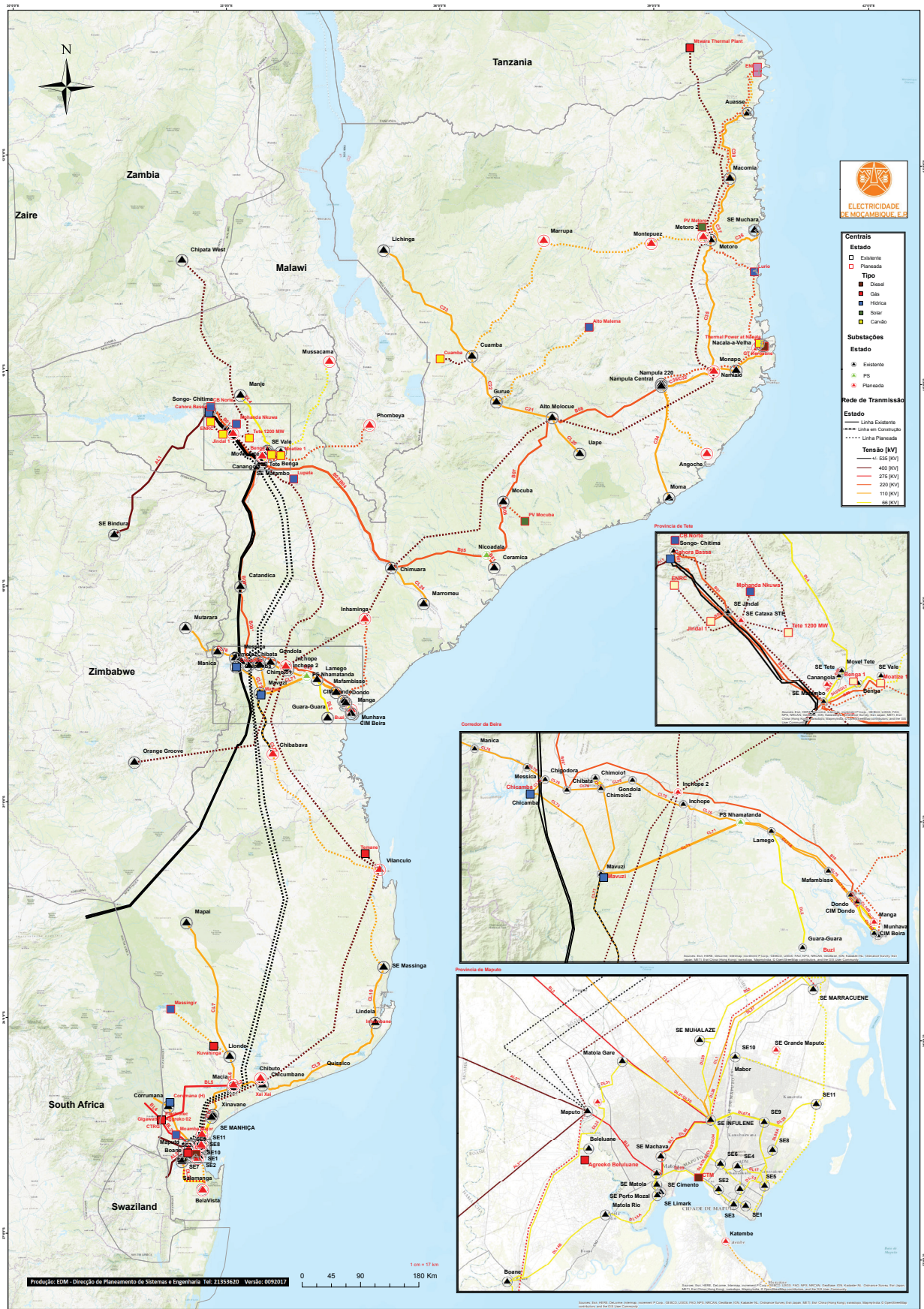


Table A1: EDM's Power project pipeline

Project Name	Type	Capacity (MW)	Investment (Million US\$)	Start Construction	Conclusion
CTM1	Gas	106	170	2016	2018
MOCUBA	Solar	40	80	2018	2018
METORO	Solar	40	80	2018	2019
Temane	Gas	100	170	2019	2021
Temane	Gas	400	650	2019	2022
CTM2	Gas	106	170	2020	2023
Temane	Gas	100	170	2020	2023
Jindal	Coal	150	300	2019	2022
Nacala	Coal	200	400	2021	2025
Tete	Coal	300	300	2019	2023
Tofo	Wind	30	100	2020	2023
Mphanda Nkuwa	Hydro	1,500	1,800	2020	2024
Tsate	Hydro	50	250	2020	2025
Tete	Coal	300	300	2023	2026
Boroma	Hydro	200	262.6	2022	2027
Lupata	Hydro	600	761.7	2022	2027
Cuamba	Coal	300	400–750	2021	2025

Table A2: EDM's regional projects pipeline

Project Name	Voltage (kV)	Investment (Million US\$)	Start Construction	Conclusion
Mozambique–Malawi	400	127	2019	2021
Mozambique–Tanzania	400	150	2021	2024
Mozambique–Zambia	400	150	2019	2021
Mozambique–Zimbabwe–South Africa (MOZISA)	400	500	2018	2023
Caia–Nacala	400	620	2018	2022
Maputo–Temane (STE1)	400	550	2019	2022
Maputo–Temane (STE1)	400	1,500	2021	2024

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