Lesotho Country Window:

Energy System Transformation Outlook (ESTO)

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Transforming Energy Sectors Globally

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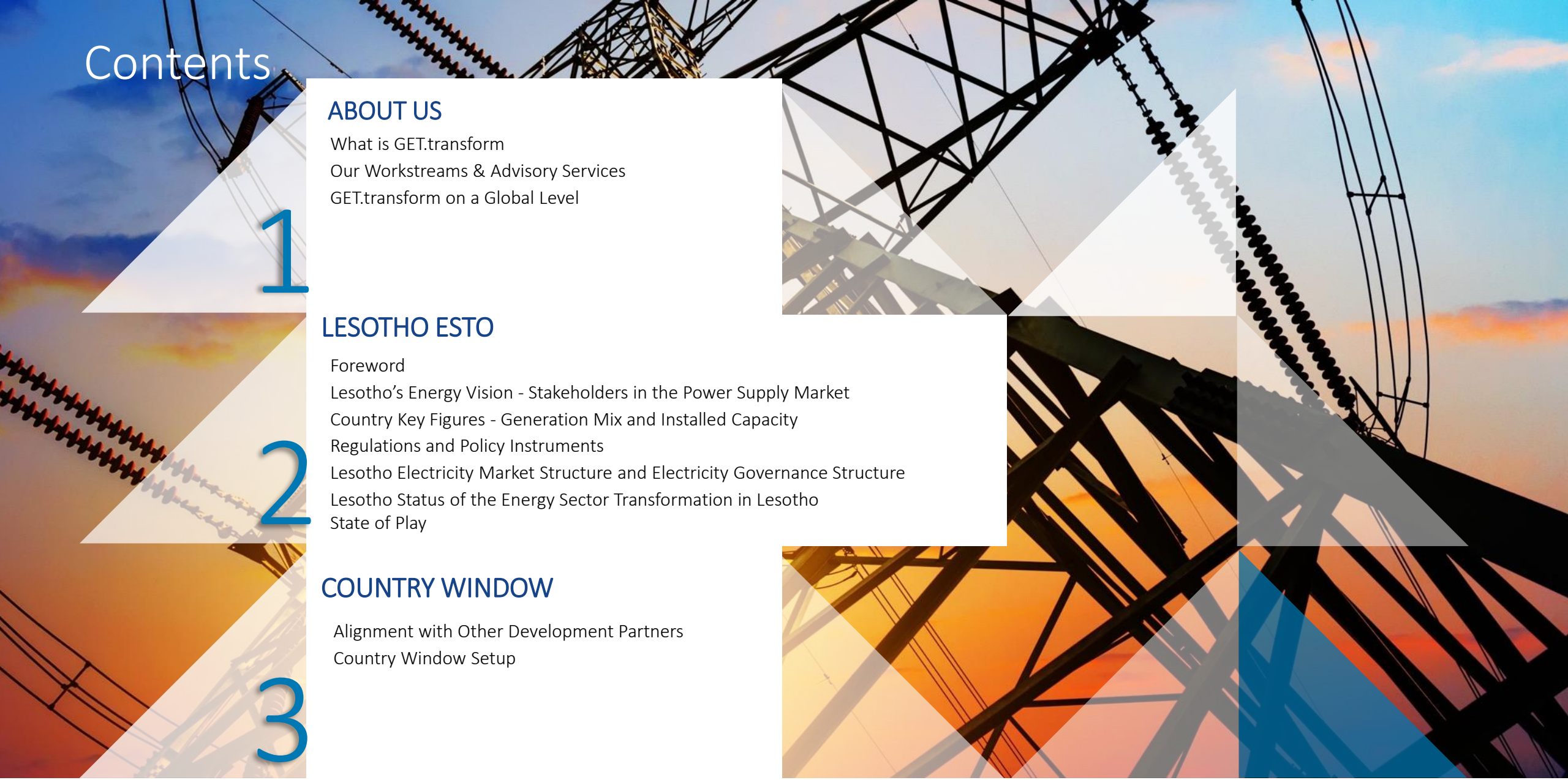

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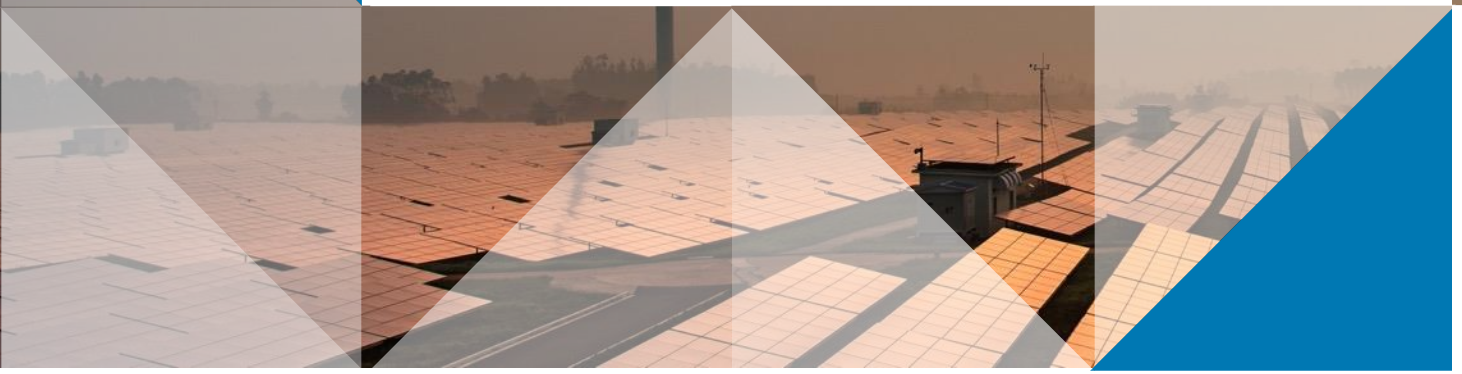
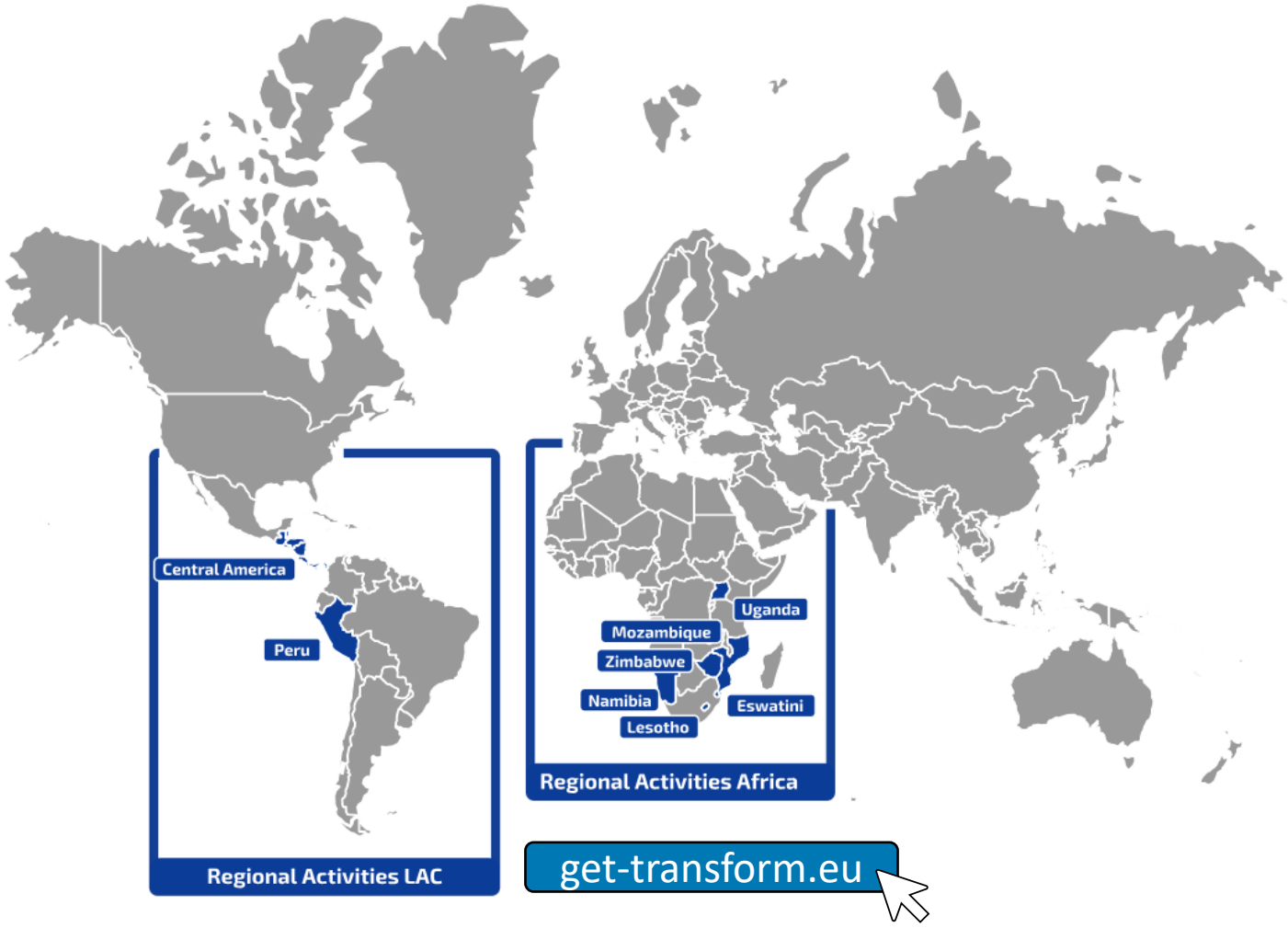
ABOUT GET.transform



What is GET.transform?

- Technical assistance (TA) and capacity building for the **public sector** to establish conducive policy and investment frameworks for the transition of the energy sector
- Hub of expertise with **> 50 renowned (inter)national energy experts**
- Implementation through **regional** and **country windows** with expert staff on the ground incl. secondments
- **Scaling across countries** through collaboration with regional institutions and other TA initiatives



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GET.transform Workstreams

LONG TERM ENERGY PLANNING

Developing integrated energy and power system investment plans, outlining development paths for energy sector transformation

RENEWABLE ENERGY GRID INTEGRATION

Updating of technical power system planning and operational procedures that enable the operation of renewable energy dominated power systems

ON-GRID REGULATION & MARKET DEVELOPMENT

Supporting institutional reforms that allow for new market actors and renewable energy participation: market model design, non-discriminatory grid access, cost-reflective services
Design and management of solicited auctions as well as market-driven mechanisms for procuring on-grid energy

OFF-GRID REGULATION & MARKET DEVELOPMENT

Supporting off-grid electrification planning and data management frameworks

Developing mini-grid regulatory frameworks and technical standards and designing award mechanisms for procuring off-grid energy

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LESOTHO ESTO

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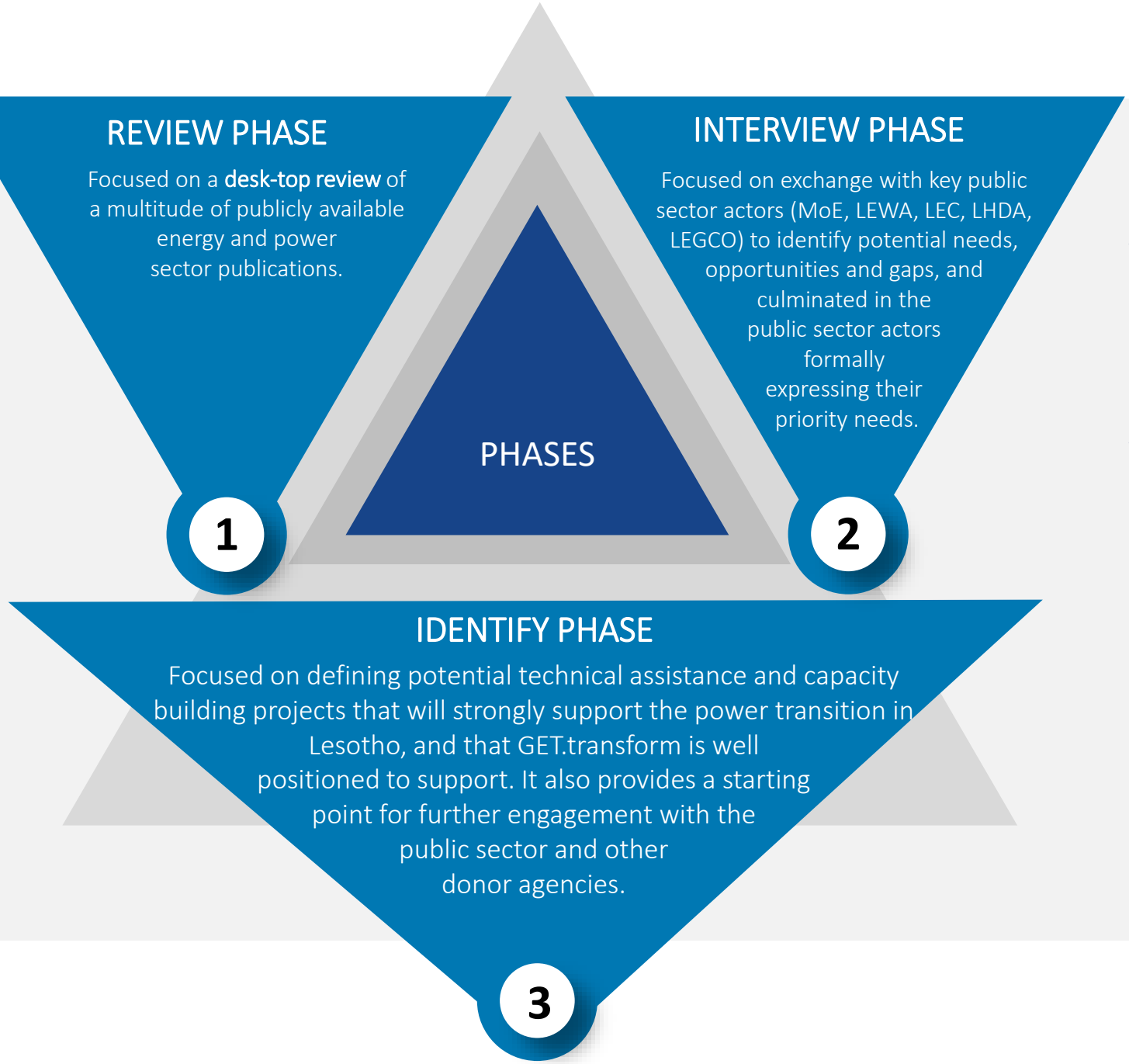
Foreword

The purpose of the Energy System Transformation Outlook (**ESTO**) is to document a high-level summary of the electricity landscape in Lesotho and to present the outcome of a high-level overview and assessment that followed a 'review, interview, identify' approach.



The ESTO is not a formula of what should be done by the country or the public sector actors.

The ESTO is a means of obtaining feedback to enrich our understanding of the energy sector in Lesotho and to identify support activities and synergies with other donor and development agencies.

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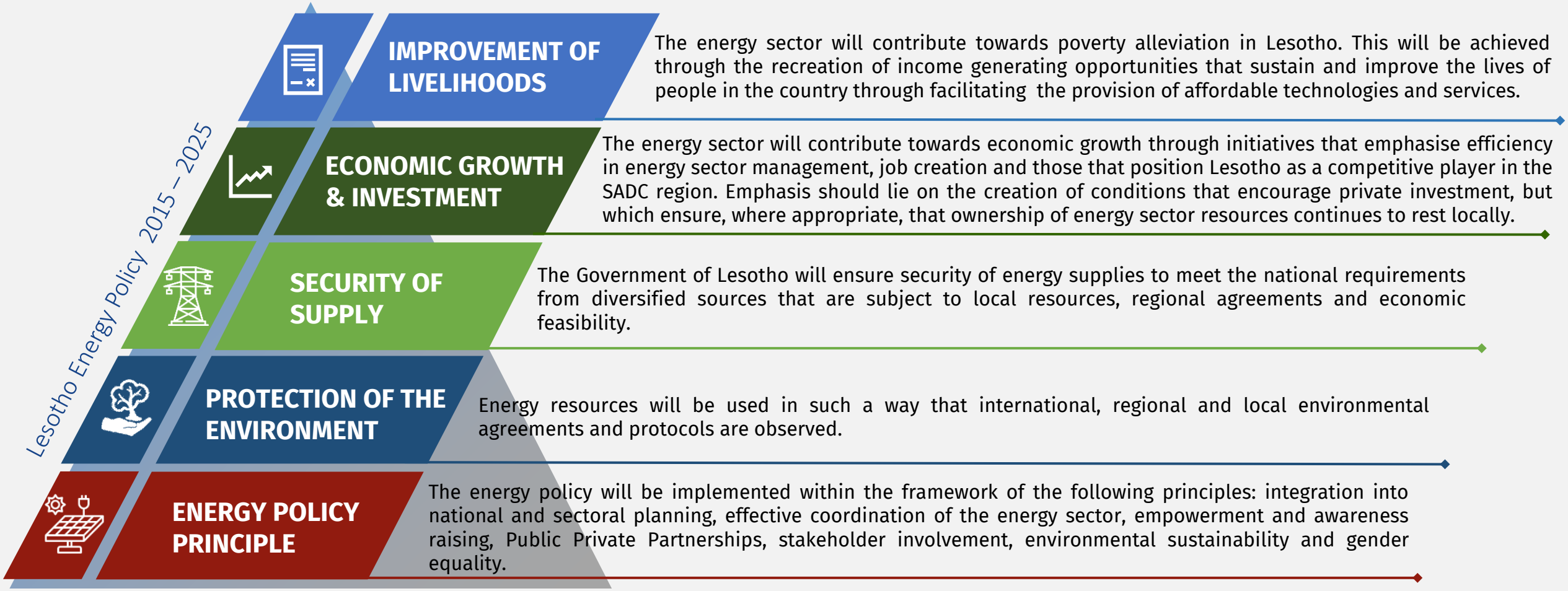
Lesotho‘s Energy Vision

“Energy shall be universally accessible and affordable in a sustainable manner, with minimal negative impact on the environment.”

Lesotho Energy Policy (LEP) 2015 - 2025



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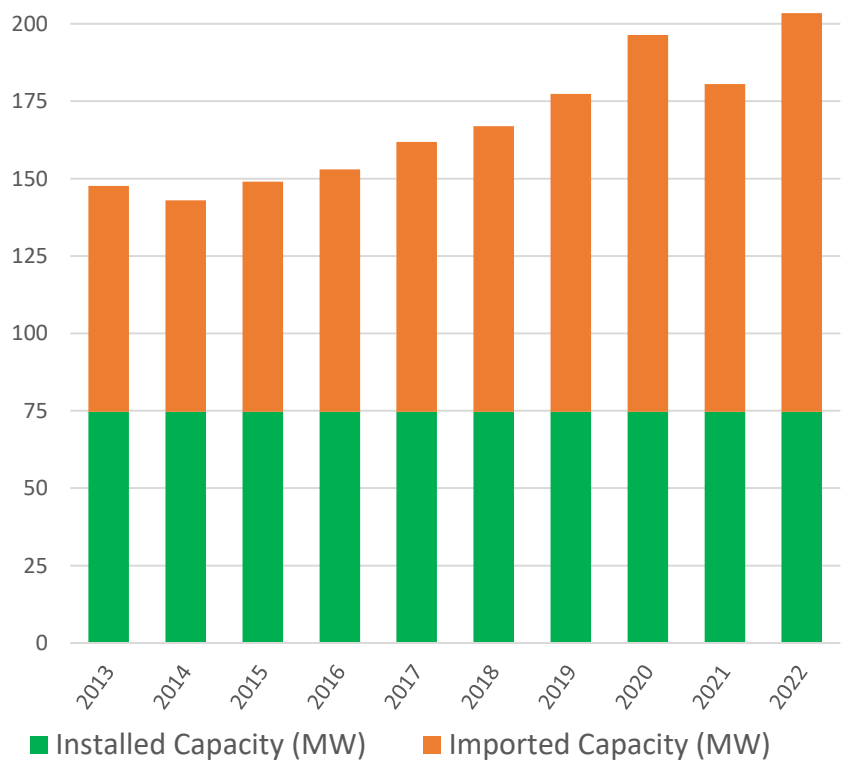
Country Key Figures

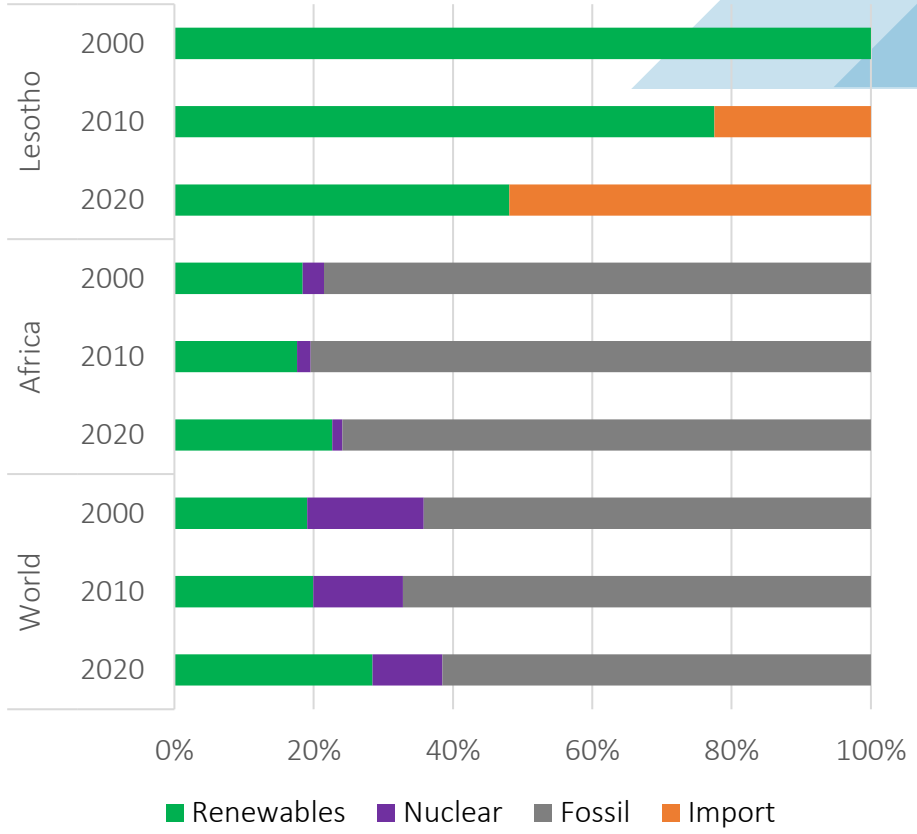
Location	Southern Africa
Population (2022)	2.3 Million (Rural – 70%, Urban – 30%) (World Bank 2022)
GDP per capita (2022)	US$ 969 (World Bank 2022)
GDP growth (2022)	1,1% (World Bank 2022)
Electricity access (2021)	50,4%* (Urban – 81%, Rural – 38%) (World Bank 2021)
Electricity consumption per capita	2,133kWh (World Data 2021)
Carbon dioxide (CO_2) emissions (2018)	1.4 tons per capita (World Data 2022)
Electricity carbon intensity (2021)	228.8 $gCO_2eq.$ / kWh (Lowercarbon 2021)

Lesotho's Generation Mix & Installed Capacity

Lesotho's Maximum Demand Profile (MW) 2013 - 2022



Lesotho's Generation Mix vs Africa vs World 2000 - 2020



Key Statistics for Lesotho

Peak Electricity demand: 203MW
Electricity consumption: 970 GWh

- Local generation: 532 GWh
- Imported electricity: 438 GWh

Installed capacity: (grid connected)

LHDA (Lesotho Highlands Development Authority)

- Muela Hydro – 74,7 MW

LEGCO (Lesotho Electricity Generation Company)

- Solar PV – 30 MW (being commissioned)
- Solar PV – 50 MW (planned for 2024 - 2025)

OnePower Pty Ltd - NEO 1 (IPP)

- Solar PV – 20 MW (planning)

Hirundo (IPP)

- Wind – 100 MW (planning)

RexiVista (IPP)

- Solar PV – 100 MW (planning)

Installed capacity: (off-grid)

OnePower Pty Ltd (IPP)

- Ha Makeba mini-grid – 50 kW

Source: own elaboration based on data from various reports, OurWorldInData.org and LEWA Annual report 2021/22

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Key stakeholders in Current Power Supply Market (1/2)

Institution		Description
Ministry of Natural Resources (MNR)		The Ministry of Natural Resources (MNR) has three departments: Energy, Water and Minerals. The Ministry of Natural Resources (MNR) and the Department of Energy (DoE) which oversee the energy sector have responsibility for policy formulation, specifying policy goals and targets, and the implementation as well as coordination of the policies and the sector plans. Both institutions are tasked with ensuring the security of energy supplies to meet the national requirement. The Rural Electrification Unit (REA), is a division in DoE responsible for implementing rural electrification projects and transferring them to LEC for operation on completion.
Lesotho Highlands Development Authority (LHDA)		The Lesotho Highlands Development Authority (LHDA) was set up to manage that part of the Katse Dam project that falls within Lesotho's borders. It included the construction, operations and maintenance of all dams, tunnels power stations and infrastructure- as well as secondary developments such as relocation, resettlement, compensation, supply of water to resettle villages, irrigation, fish hatcheries and tourism. It is the owner and operator of the 72 MW Muela Hydro Power Station and sells the energy generated to LEC.
Lesotho Electricity Generation Company (LEGCO)		The Lesotho Electricity Generation Company (LEGCO) is a company wholly owned by the Government of Lesotho. LEGCO was incorporated on the 29th January 2020 as a public company under the Companies Act of 2011. It commenced its full operations on the 1st September 2020. LEGCO is mandated to promote generation of electricity in the country and ensure security of electricity supply (achieve self-sufficiency and electricity independence). One of the electricity generation project under its direct supervision is the 70MW solar project at Ha Ramarothole in Mafeteng.
Lesotho Electricity and Water Authority (LEWA)		The Lesotho Electricity and Water Authority (LEWA), is a statutory body established through the Lesotho Electricity Authority Act, Act no 12 of 2002, as amended. The general duties of the LEWA is set out in section 21 (1) of the before mentioned Act.

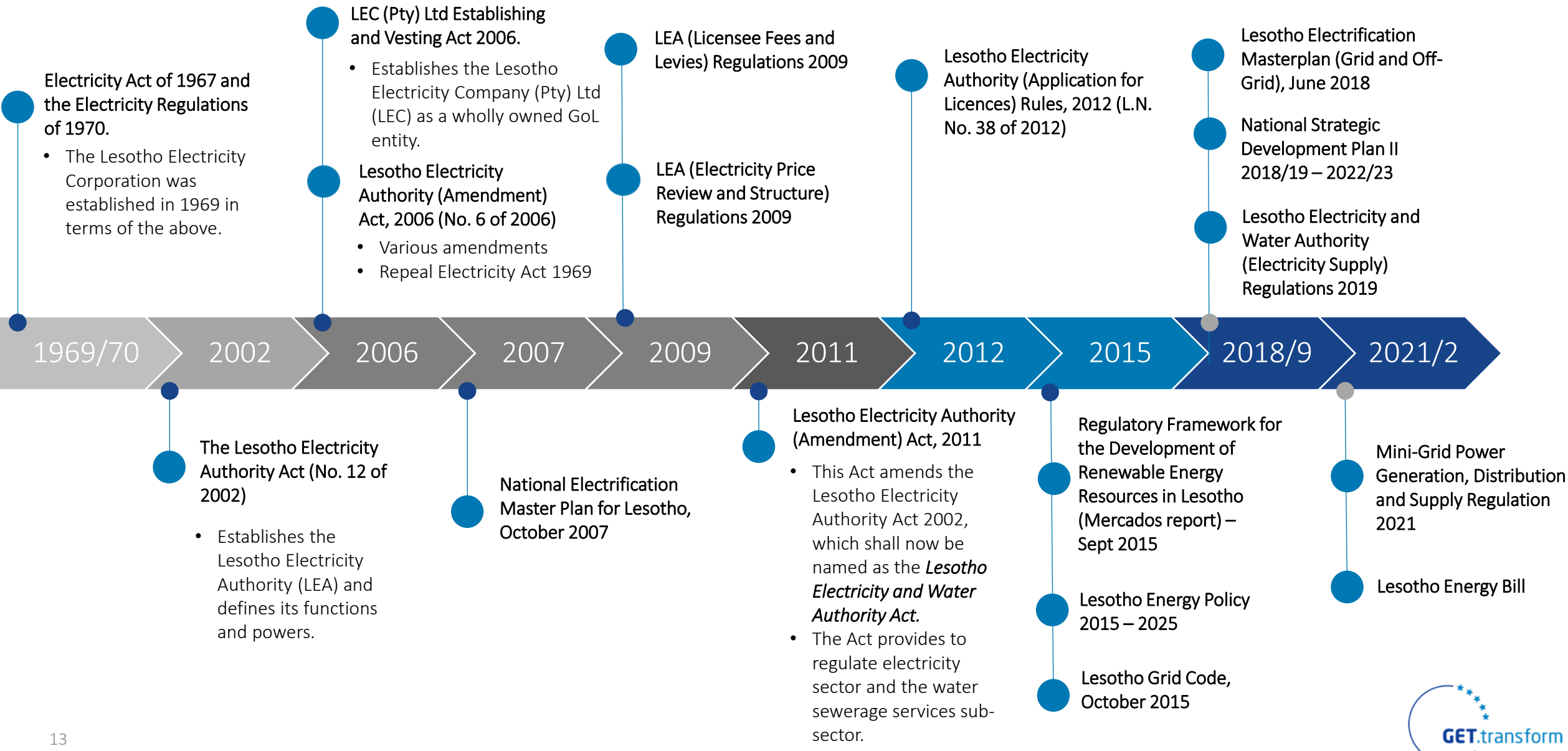
Source: own elaboration based on data from various reports and Lewa.org.ls

Key Stakeholders in Current Power Supply Market (2/2)

Institution		Description
Lesotho Electricity Company (LEC)		The Lesotho Electricity Company (Pty) Ltd (LEC) is wholly owned by the Government of Lesotho (GoL) and act as the utility company. It has been registered in terms of the Companies Act of 1967 (as amended) and established in 2006 in terms of the LEC (Pty) Ltd Establishing and Vesting Act 2006. The assets, liabilities, rights and obligations of the former Lesotho Electricity Corporation were vested in the company. Previously as a Corporation, LEC was established in 1969 in terms of the Electricity Act of 1967 and the Electricity Regulations of 1970. The company assumes a separate legal persona and can sue or be sued in its own right. It is licensed to operate under the Lesotho Electricity Authority Act of 2002, as amended.
OnePower Africa		1PWR is a fast-growing startup based in Lesotho whose mission is to provide affordable and reliable electricity services to off-grid villages, giving families, schools, health clinics, and local businesses the resources needed to grow and thrive. Portfolio includes: (a) a developed mini-grid at Ha-Mabeka, (b) 10 further mini-grids under development, and (c) a major shareholder and developer role in the NEO1 20MW Solar PV IPP development in the Mafeteng District.
Import Partners	Eskom ELECTRICIDADE DE MOÇAMBIQUE, E.P. SAPP	Eskom is a South African electricity utility that is a member of SAPP and has entered into a long-term agreement with LEC for the supply of electricity. LEC imports bulk of its electricity from Eskom. EDM is a Mozambican electricity utility that is a member of SAPP and currently supply Lesotho with up to 20 MW of power.

Source: own elaboration based on data from various reports and Lewa.org.ls

Regulation and Energy Policy Instruments



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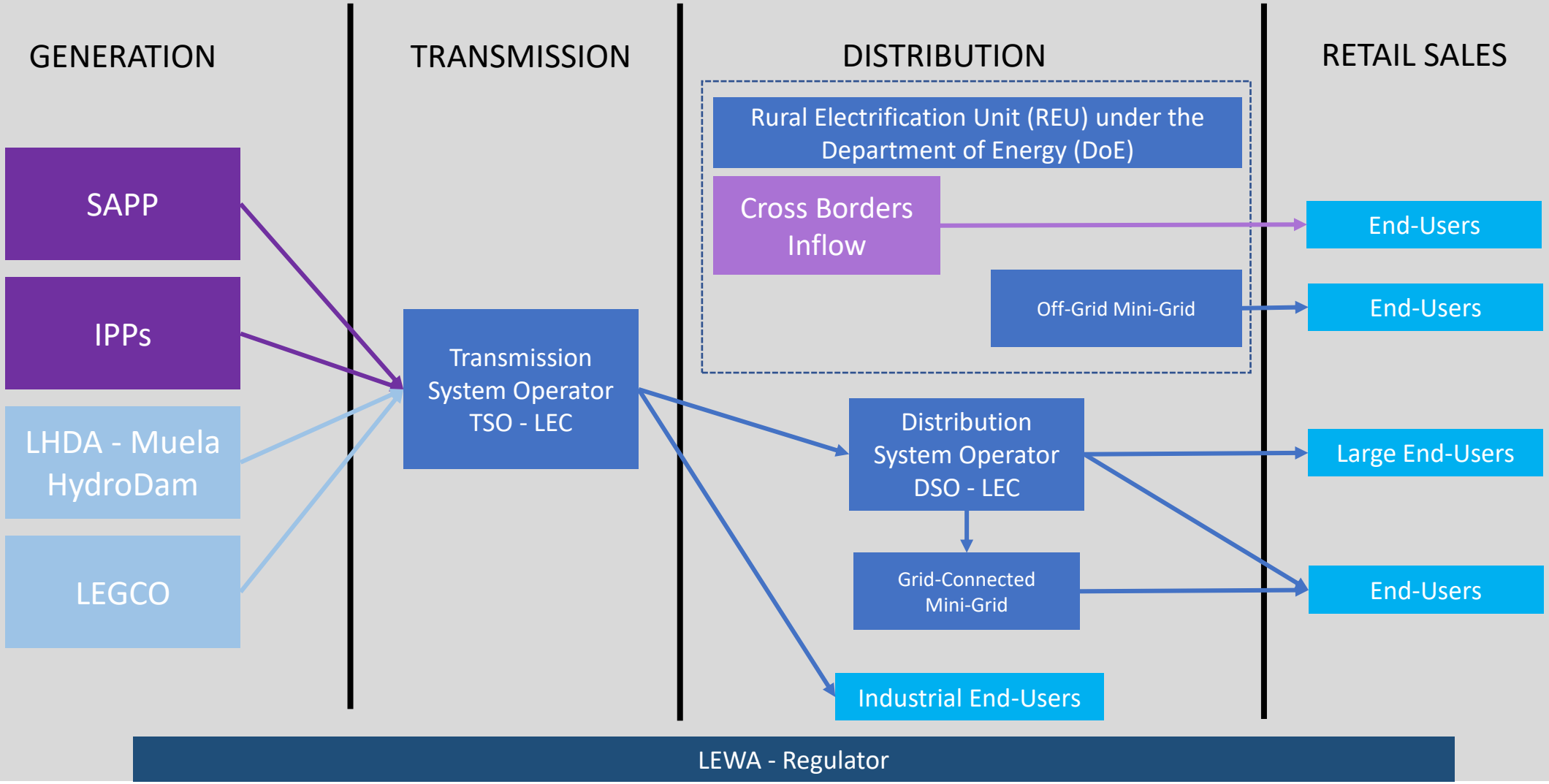
Lesotho Electricity Market Structure



Blue entities are part of the Lesotho public system, other colours are private or regional systems
Source: own elaboration and based on the draft IPP and Mini-grid Framework document released by DoE

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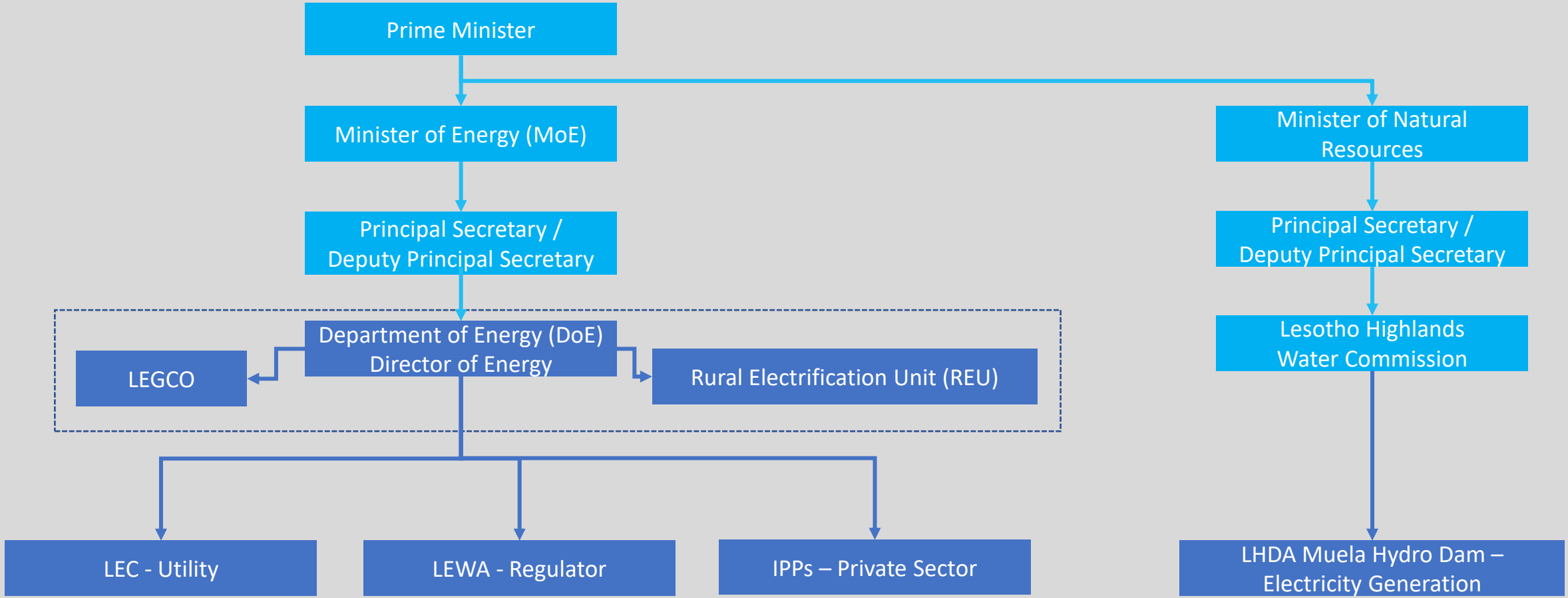
Lesotho Electricity Governance Structure



Technically appointed *Politically appointed*

Source: own elaboration

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Status of Energy Sector Transformation in Lesotho

The energy sector in Lesotho is characterised by an enormous potential of renewable energy resources. Lesotho has the potential to produce up to 6,000 MW from wind and solar, 4,000 MW from pump storage, 400 MW from conventional hydropower, and more than 1,200 MW from hydropower.

However, the current demand for electricity continues to exceed the local generation. Electricity imports from South Africa and Mozambique account for more than 50% of the electricity consumption, which in the case of South Africa comes mostly from coal power plants.

Lesotho's electricity policies aim to provide reliable and sustainable energy to all its residents. Lesotho has the ambition to become fully electricity independent through the use of their vast renewable energy resources, to increase the electrification rate and provide universal energy access by 2030.

Lesotho's National Strategic Development Plan (NSDP) II and Electrification Master Plan enable the need for the energy sector to harness the available renewable energy potential.

During the next five years, the Government of Lesotho will promote renewable energy by harnessing energy from wind, solar, and water. In addition, the new Energy Bill, currently being approved, will enable the transformation to a fully green energy sector.

By allowing public IPPs, private IPPs and off-grid electricity developers to implement and further electrify the country, significant steps have been made towards the goal of renewable energy independence and universal electricity access.

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Overarching Activities	Capacity Building			
	Technical Assistance			
Key Topics	Planning Governance	Grid Codes	Power Sector Strategy	Integrated Electrification Planning
	Scenarios and Modelling	Transmission System Planning and Operation	Governance	Mini-Grid Framework
	Adoption and Implementation	Distribution System Planning and Operation	Market Mechanisms	Public Mini-Grid Incentives

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State of Play

LONG TERM ENERGY PLANNING

RENEWABLE ENERGY GRID INTEGRATION

ON-GRID REGULATION & MARKET DEVELOPMENT

OFF-GRID REGULATION & MARKET DEVELOPMENT

Highlights

- The National Strategic Development Plan II – 2018/19 – 2022/23 sets out the goal of 35% electrification rate in the rural areas from Renewable Energy by 2025 and Universal Access by 2030.
- Lesotho has the potential to produce up to 6.000MW from wind and solar, 4.000MW from pump storage, 400MW from conventional hydropower, and more than 1.200MW from hydropower.
- Lesotho submitted their first NDC in January 2017 which make them recognise the Paris Agreements. This NDC resulted in the creation of The National Climate Change Policy 2017 – 2027.
- Around half of the total electricity supply comes from Muela Hydro Dam, which primary objective was to enable a steady water supply to Lesotho and South Africa. The capacity to produce electricity was added at a later stage.

Potential Support Projects

- Technically support the DoE in the Least Cost Power Development Plan financed by the World Bank and engage with additional capacity building
- Elaborate different concept notes for the pipeline projects from DoE to unlock further funding from the EIB
- Technically review the Lesotho Energy Policy 2015 – 2025 and propose an updated version for 2025 – 2035
- Support the DoE in creating a Short-term Generation Expansion Plan with different power supply scenarios in an open-source model such as PyPSA.
- Eligibility check for the ERC/NUL for a local grant agreement and engage with them on different LTEP topics and capacity building

Challenges

- Development of the Integrated Resources Plan is still outstanding.
- The roadmap set out in the Electrification Master Plan 2018 – 2038 which was adopted by Cabinet, isn't fully implemented.
- The ambitious targets set in the National Strategic Development Plan II – 2018/19 – 2022/23 are still far from being realised
- Lack of a fully coordinated integrated sector planning framework that incorporates generation (including IPP integration), transmission, distribution and rural electrification (on-grid and off-grids)
- Lack of coordinated planning between development partners and stakeholders in electricity sector.

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State of Play

LONG TERM ENERGY PLANNING

RENEWABLE ENERGY GRID INTEGRATION

ON-GRID REGULATION & MARKET DEVELOPMENT

OFF-GRID REGULATION & MARKET DEVELOPMENT

© LEGCO

30MW Solar Plant commissioned 2023 - LEGCO

©LHDA

72 MW Muela Hydro Dam – LHDA

Highlights

- The 'Regulatory Framework for the Development of Renewable Energy Resources in Lesotho' from 2015 covers all of the aspects in terms of licensing for IPP's, however it hasn't been updated nor officially gazetted since then.
- Current structure allows IPPs to sell directly to LEC as single buyer
- Every IPP negotiates their PPA with LEC directly which needs to be approved by LEWA afterwards.

Potential Support Projects

- Create and implement a methodology to elaborate and calculate the capacity of variable renewable energy integration in the transmission grid
- Review of the Grid Codes for Transmission
- Review of the Grid Codes for Distribution
- Support the LEC with an electricity load forecasting system
- Support the LEC with a solar and wind power generation forecasting system
- Create a technical guidance document for grid compliance and grid impact studies

Challenges

- Lack of guidance documents for grid compliance and standardized grid impact studies
- Lack of progress in translation the targets of becoming fully electricity independent and trading electricity into the SAPP
- No electricity load forecasting system in place with and no optimization of maximizing cheap electricity generation or import
- Distribution grid codes still need a lot of development to fully function as guidelines

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State of Play

LONG TERM ENERGY PLANNING

RENEWABLE ENERGY GRID INTEGRATION

ON-GRID REGULATION & MARKET DEVELOPMENT

OFF-GRID REGULATION & MARKET DEVELOPMENT

Highlights

- The LEP states that the distribution segment of the industry is open to public sector, private sector and cooperatives. To facilitate this, wholesale tariffs that support bulk purchasing and retailing of electricity as well as transparent tariffs that reflect the costs at every stage of the value chain were to be introduced.
- To facilitate the connection of IPPs to the networks, the LEP guarantees access of licensed renewable energy generators of less than 500kW to the distribution network and those above 500kW to the transmission network on payment of the prescribed fee.
- Transmission remains public but IPPs are allowed to export power subject to the right of first refusal by LEC to purchase the power under a long term PPA.
- The Regulatory Framework for the Development of Renewable Energy Resources in Lesotho (2015) provides an IPP framework with supporting legal instruments to guide in the promotion and facilitation of private investments in renewable energy. However, the report hasn't been implemented.

Potential Support Projects

- Develop a SAPP Trading Mandate with LEC to set up an Energy Trading Office within
- Support LEWA with the Multi-Year Tariff Application from LEC and provide capacity building in assessing tariff applications
- Support DOE/LEC/LEWA with guidelines and standards on how to set up distributed electricity or small-scale embedded generation
- Support LEGCO with an owner's engineer and transaction advisor for the construction of their 2phase – 50MW PV power
- Review the current IPP frameworks and capacitate DOE/LEC/LEW into the different auction mechanisms and procedures.

Challenges

- Operation inefficiencies and weak financial performance of the national power utility, LEC.
- Non-cost-reflective tariffs, leading to low investment and poor service delivery
- Low capital investment coupled with ageing infrastructure
- High technical and non-technical losses
- The lack of a clear legal framework for private investment in the sector

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State of Play

LONG TERM ENERGY PLANNING

RENEWABLE ENERGY GRID INTEGRATION

ON-GRID REGULATION & MARKET DEVELOPMENT

OFF-GRID REGULATION & MARKET DEVELOPMENT

Highlights

- The Energy Bill, which is currently awaiting ratification, stipulates the creation of the National Energy Fund (NEF) that has the specific focus of off-grid electrification and increasing the electrification rate
- Through the Energy Bill, the Rural Electrification Unit will transform into the Rural Electrification Agency with a clear mandate to implement rural energy access programmes

©EU/Silvia Sala

Ha Makebe – OnePower Lesotho

- The National Strategic Development Plan II envisions universal access by 2030
- The "Renewable Energy Performance Platform (REPP)" and "Lesotho Renewable Energy and Energy Access Project (LREEAP)" are implementing and constructing mini-grids through privately owned concessions

Potential Support Projects

- Geospatial electricity access mapping in GIS, with training and capacity building
- Off-grid rural electrification training in technical design, business models and procurement
- Off-grid regulations and policy review
- Support the development of a financial modelling tool for financial planning and tariff setting of mini-grids

Challenges

- Lack of clarity on mini-grid tariff setting and mini-grid regulations
- Lack of maintenance of off-grid solar systems installed
- Rural Electrification Unit with the mandate to work on off-grid electrification has limited resources
- No clear identification for potential sites for off-grid electrification
- The Electrification Master Plan 2018 isn't being implemented nor provide suitable procurements mechanisms for mini-grids

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Status of Technical Assistance

LONG TERM ENERGY PLANNING

- Technically support the DoE in the Least Cost Power Development Plan financed by the World Bank and engage with additional capacity building
- Elaborate different concept notes for the pipeline projects from DoE to unlock further funding from the EIB
- Preparation for a grant agreement with ERC/NUL to engage them on different LTEP topics and capacity building
- Support the DoE in creating a Short-term Generation Expansion Plan with different power supply scenarios in an open-source model such as PyPSA.

RENEWABLE ENERGY GRID INTEGRATION

- Review of the Grid Codes for Transmission and Distribution
- Create and implement a methodology to elaborate and calculate the capacity of variable renewable energy integration in the transmission grid
- Support the LEC with an electricity load forecasting system and solar and wind power generation forecasting system
- Create a technical guidance document for grid compliance and grid impact studies

ON-GRID REGULATION & MARKET DEVELOPMENT

- Develop a SAPP Trading Mandate with LEC to set up an Energy Trading Office within
- Support LEWA with the Multi-Year Tariff Application and provide capacity building in assessing tariff applications
- Support DOE/LEC/LEWA with guidelines and standards on how to set up distributed electricity or small-scale embedded generation
- Support LEGCO with an owner's engineer and transaction advisor for the construction of their 2phase – 50MW PV power
- Review the current IPP frameworks and capacitate DOE/LEC/LEW into auction mechanisms and procedures.

OFF-GRID REGULATION & MARKET DEVELOPMENT

- Geospatial electricity access mapping in GIS, with training and capacity building
- Off-grid rural electrification training in technical design, business models and procurement
- Off-grid regulations and policy review
- Support the development of a financial modelling tool for financial planning and tariff setting of mini-grids

Activities supported by GET.transform: Ongoing | Planned | Completed | Not Covered

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3

COUNTRY WINDOW

Alignment with Other Development Partners

EU-SUPPORTED					
GET.transform	GET.invest	UNDP	ElectriFI	World Bank	USAID
Energy Sector Transformation	Private Sector Mobilisation	Grant Facility	Lending Facility	Energy Sector Reform	Power Africa
Component 1 of the Renewable Lesotho Programme Providing technical assistance to the public sector. Running until June 2026 with a team on the ground in Lesotho Maseru.	Mobilising private sector investment in renewable energy project. Running until June 2026 with a team on the ground in Lesotho Maseru.	**Component 2 of the Renewable Lesotho Programme** – Providing financial support for project development through different technology windows. Running a results-based financing mechanism for different technology to improve energy access in the country. Office based in Lesotho Maseru.	**Component 3 of the Renewable Lesotho Programme** – Providing financial support for project developpers through different technology windows. Office based in Brussels.	Running the Lesotho Renewable Energy and Energy Access Project (LREEAP). Focus on increasing the energy access through mini-grids, developing the least cost power development plan and electrification strategy. Office based in Pretoria.	Empower Southern Africa – 5-year programme from 2023 – 2028 with a focus on increasing energy access, use of electricity from renewable energy sources, boost investment and foster innovation in the energy sector. Office based in Pretoria.

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Country Window Setup

Country

- 1 Country Window Coordinator
- 3 Technical Advisors
- Admin support
- Integrated with existing GIZ structures

GET.transform HQ

- 1 x Africa Partnerships Coordinator for overarching CW strategy support.
- 1 x Advisory Services Focal Point for LTEP and RE-Integration.
- 1 x Advisory Services Focal Point for Policy and Regulation.

Technical Assistance Partners

energynautics
solutions for sustainable development

GFA
CONSULTING GROUP

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Thank You for Your Attention

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