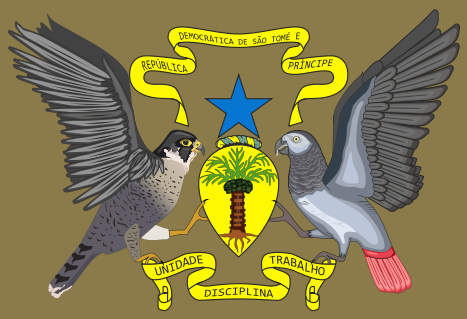
FIRST PLAN OF ACTION

FOR THE DECARBONIZATION AND RESILIENCE OF THE ENERGY SECTOR OF SÃO TOMÉ AND PRÍNCIPE



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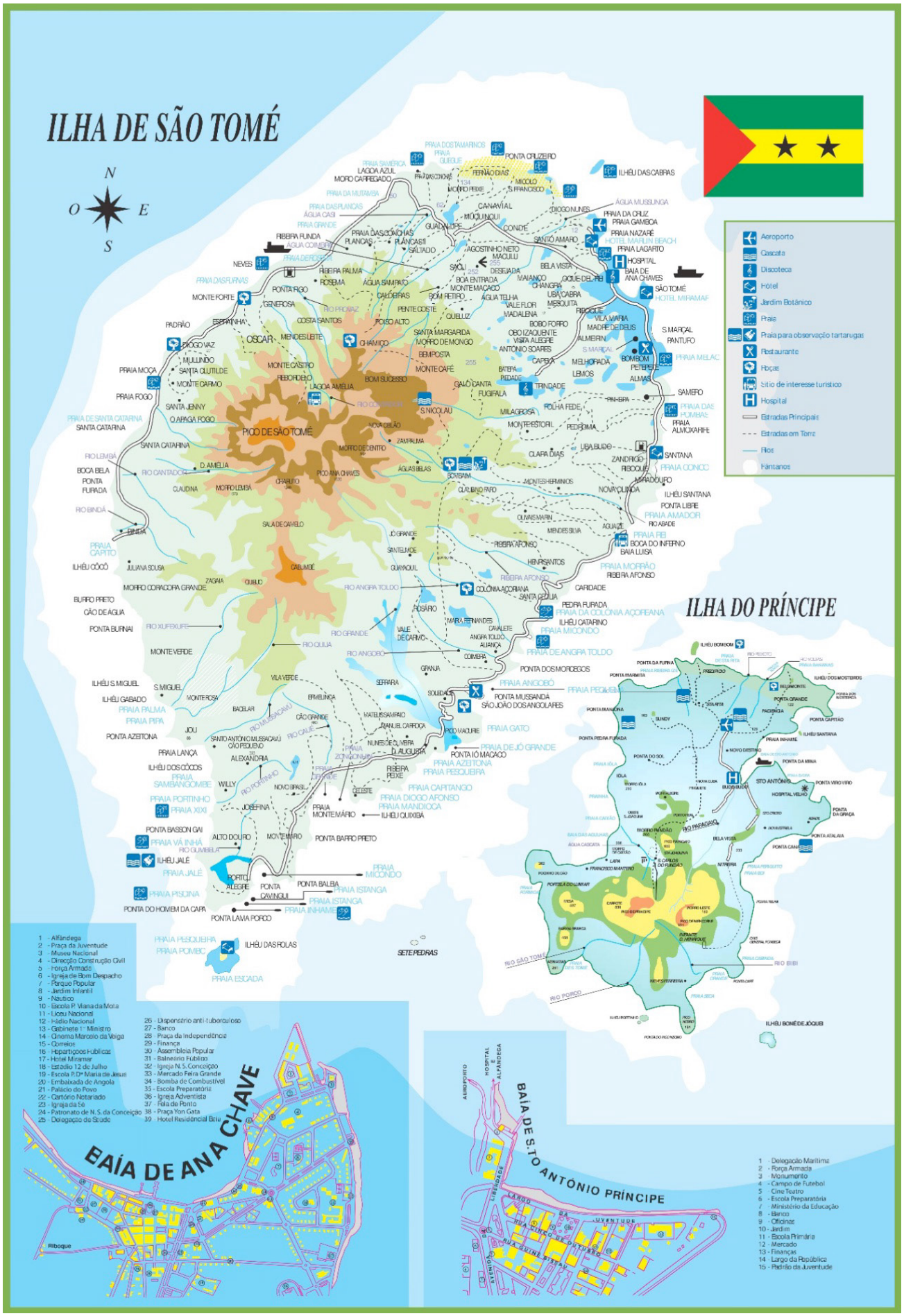

ILHA DE SÃO TOMÉ
ILHA DO PRÍNCIPE
N
O
E
S
Aeroporto
Cascata
Discoteca
Hotel
Jardim Botânico
Praia
Praia para observação tartarugas
Restaurante
Roças
Sitio de interesse turistico
Hospital
Estradas Principais
Estradas em Terra
Rios
Pântanos
PICO DE SÃO TOMÉ
BAÍA DE ANA CHAVE
BAÍA DE S.TO ANTÓNIO PRÍNCIPE
SETE PEDRAS
1 - Alfândega
2 - Praça da Juventude
3 - Museu Nacional
4 - Direcção Construção Civil
5 - Força Armada
6 - Igreja de Bom Despacho
7 - Parque Popular
8 - Jardim Infantil
9 - Náutico
10 - Escola P. Viana da Mota
11 - Liceu Nacional
12 - Hóstio Nacional
13 - Gabinete 1º Ministro
14 - Cinema Marcelo da Veiga
15 - Correios
16 - Repartições Públicas
17 - Hotel Miramar
18 - Estádio 12 de Julho
19 - Escola P.Dª Maria de Jesus
20 - Embaixada de Angola
21 - Palácio do Povo
22 - Cartório Notariado
23 - Igreja da Sé
24 - Patronato de N. S. da Conceição
25 - Delegação de Saúde
26 - Dispensário anti-tuberculoso
27 - Banco
28 - Praça da Independência
29 - Finança
30 - Assembleia Popular
31 - Balneário Público
32 - Igreja N.S. Conceição
33 - Mercado Feira Grande
34 - Bomba de Combustível
35 - Escola Preparatória
36 - Igreja Adventista
37 - Fela de Ponto
38 - Praça Yon Gata
39 - Hotel Residêncial Bela
1 - Delegação Marítima
2 - Força Armada
3 - Monumento
4 - Campo de Futebol
5 - Cine Teatro
6 - Escola Preparatória
7 - Ministério da Educação
8 - Banco
9 - Oficinas
10 - Jardim
11 - Escola Primária
12 - Mercado
13 - Finanças
14 - Largo da República
15 - Padrão da Juventude

FOREWORD

The transition to a low-carbon economy is simultaneously one of the biggest challenges and biggest opportunities for São Tomé and Príncipe (STP). Global climate change threatens our very way of life, but we can no longer continue to rely on old energy supply sources like imported diesel. Today, STP's energy expenditures are consuming our national budget, and our debt payments are preventing us from supporting other priorities like health and education for our young population. With the high cost of electricity production, we cannot develop a sustainable model for economic growth. Our vision to extend electricity to all Saotomeans, up from the current share of 84 percent, will not achieve the desired impact if it is not affordable. We need to take drastic action now.

This Plan of Action for the Decarbonization and Resilience of the Energy Sector (PADRES) was prepared with the aim of guiding this transition in a responsible, sustainable, and innovative way. It offers a comprehensive and progressive vision toward 2030 and 2035, defining the steps to a clean and sustainable energy future as the basis of the country's long-term transformation to a resilient economy. It is a time-bound roadmap that lays out the government's concrete and tangible priorities to transition from the use of diesel toward cheaper, more sustainable, and greener electricity generation and reduce carbon emissions in the electricity generation, transport, and cooking sectors.

For our country, this plan is not only a response to climate obligations, but also an opportunity to reconfigure our energy infrastructure to ensure a more energy-secure, climate-resilient, and economically and socially prosperous future. We will explore new business models that bring in solar energy and batteries to supply electricity to our people. We will use new technologies to reduce energy losses. We will prepare and develop small hydro resources in a socially and environmentally responsible manner. We will expand the choices people have for clean––and

healthy––cooking. We will introduce electric vehicles, which, in turn, will need more clean energy in our system, creating a virtuous cycle. We will encourage the practice of energy efficiency.

Despite the high upfront costs and real and perceived risks of our small market and remote location, we know that our problems are surmountable. We know that we will need to be pragmatic about solutions and invite the support of the private sector where it can move quickly and bring in new technologies.

For our part, we will work to strengthen the policy environment needed to derisk private investment and enable the desired investments. The current state of the electricity sector undermines confidence among auditors and financiers. Therefore, securing the financial viability of the electricity sector is our highest priority. We are implementing reform actions to improve the efficiency, transparency, and accountability of sector operations in the key business areas of electricity supply, commercial functions, and management of corporate resources, with specific emphasis on better service quality and nontechnical loss reduction. We will work on regulations that improve fuel efficiency in the transport sector and incentivize a transition toward cleaner cooking technologies and options maximizing benefits for our women and children, in particular.

We feel confident that with the support of development partners and the philanthropic community, we can realize our ambition to turn the economy around for the benefit of our children, men, and women.

Patrice Emery Trovoada
Prime Minister of the Democratic Republic of São Tomé and Príncipe

FIRST PLAN OF ACTION

FOR THE DECARBONIZATION AND RESILIENCE OF THE ENERGY SECTOR OF SÃO TOMÉ AND PRÍNCIPE

ABBREVIATIONS AND ACRONYMS

ARR	Agreed revenue requirement
ASCENT	Accelerating Sustainable and Clean Energy Access Transformation Program
BESS	Battery energy storage systems
CNMC	National Committee for Climate Change
CO2	Carbon dioxide
CTF	Clean Technology Fund
DALYs	Disability-adjusted life years
DGRNE	General Directorate of Natural Resources and Energy
DSM	Demand-side management
EMAE	Empresa de Água e Eletricidade (Water and Electricity Company)
ESIA	Environmental and social impact assessment
EV	Electric vehicle
GDP	Gross domestic product
GFEI	Global Fuel Economy Initiative
GgCO2e	Gigagrams of carbon dioxide equivalent
GHG	Greenhouse gas
ICS	Improved cookstove
IFC	International Finance Corporation
INPIEG	Instituto Nacional para Promoção da Igualdade Equidade de Género (National Institute for the Promotion of Gender Equality)
INTT	Instituto Nacional dos Transportes Terrestres (National Institute of Land Transportation)
IPP	Independent power producer
KPI	Key performance indicator
ktCO2e	Kilotonnes of carbon dioxide equivalent
kV	Kilovolt
kWh	Kilowatt hour
l/100km	Liters per 100 kilometers

LDC	Least Developed Country
LED	Light-emitting diode
LNG	Liquified natural gas
LPG	Liquified petroleum gas
LV	Low voltage
MIRN	Ministério das Infraestruturas e Recursos Naturais (Ministry of Infrastructure and Natural Resources)
mpg	Miles per gallon
MTF	Multi-Tier Framework
MV	Medium voltage
MW	Megawatt
MWp	Megawatt peak
NDC	Nationally Determined Contribution
PADRES	Plan of Actions for the Decarbonization and Resilience of the Energy Sector
PAEV	Plano de Acção de Energia Verde (Green Energy Acceleration Plan)
PANEE	Plano de Acção Nacional de Eficiência Energética (National Action Plan for Energy Efficiency)
PANER	Plano de Acção Nacional no sector das Energias Renováveis (National Action Plan for Renewable Energy)
PNACLM	Plano Nacional de Acção sobre Cozinha Limpa e Moderna (National Action Plan on Clean and Modern Cooking)
PV	Photovoltaic
SIDS	Small Island Developing States
STP	São Tomé and Príncipe
tCO2e	Kilotonnes of carbon dioxide equivalent
UNESCO	United Nations Educational, Scientific and Cultural Organization
VAT	Value-added tax
VRE	Variable renewable energy

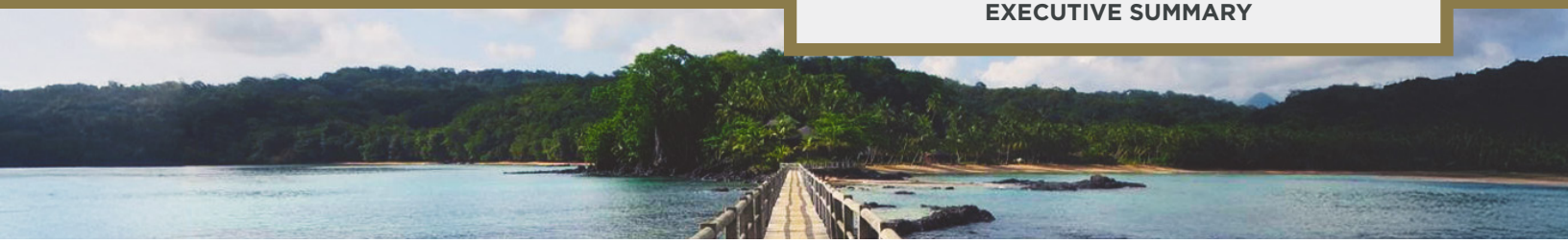
EXECUTIVE SUMMARY

São Tomé and Príncipe (STP) is blessed with unique biodiversity and more endemic species per square kilometer than most places on earth, but it is facing a crisis. It's exclusive economic zone, which is approximately 160 times the archipelago's landmass, is a maritime biodiversity hotspot and is the habitat of high numbers of unique species. Given its rare natural wealth, around 30 percent of STP's land area has been recognized as a biosphere reserve by the United Nations Educational, Scientific and Cultural Organization (UNESCO) since 2012. However, recurrent fiscal crises, primarily driven by the energy sector, stifle opportunities for growth.

Like many other Small Island Developing States (SIDS), STP faces the challenges of a remote location and geographic isolation, which impact the country through high costs for importing and exporting goods as well as international transport and logistics. Factors like small population size, remoteness from international markets, high transportation costs, vulnerability to exogenous economic shocks, and fragile land and marine ecosystems make SIDS particularly vulnerable to biodiversity loss and climate change because they lack economic alternatives. STP contributes negligibly to global warming (and is a carbon sink) and has limited mitigation potential.

STP is highly dependent on imported diesel, which is used for 97 percent of its current electricity production. Fuel costs depend on and fluctuate according to international prices as the country's average monthly import bill for all uses is in the range of US$5 million. The sector weighs heavily on the state budget with the government contributing as much as US$7 million in recent quarters toward fuel purchases for electricity generation alone (World Bank 2023). End-user electricity tariffs are high (US$0.22 per kilowatt hour – kWh), but still well below the cost of generation (US$0.34 per kWh). This motivates STP to capitalize on its renewable energy resources to mitigate and adapt to its climate-induced vulnerabilities while ensuring energy security and sustainable socioeconomic growth.

The Plan of Actions for the Decarbonization and Resilience of the Energy Sector (PADRES) offers a comprehensive and progressive vision toward 2030 and 2035, defining the steps to a clean and sustainable energy future as the basis of the country's long-term transformation to a resilient economy. It includes a time-bound roadmap that lays out the government's concrete and tangible priorities to transition from the use of diesel toward cheaper, more sustainable, and greener electricity generation; reduce fuel use in the transport sector; and improve health outcomes through clean cooking technologies and fuels.

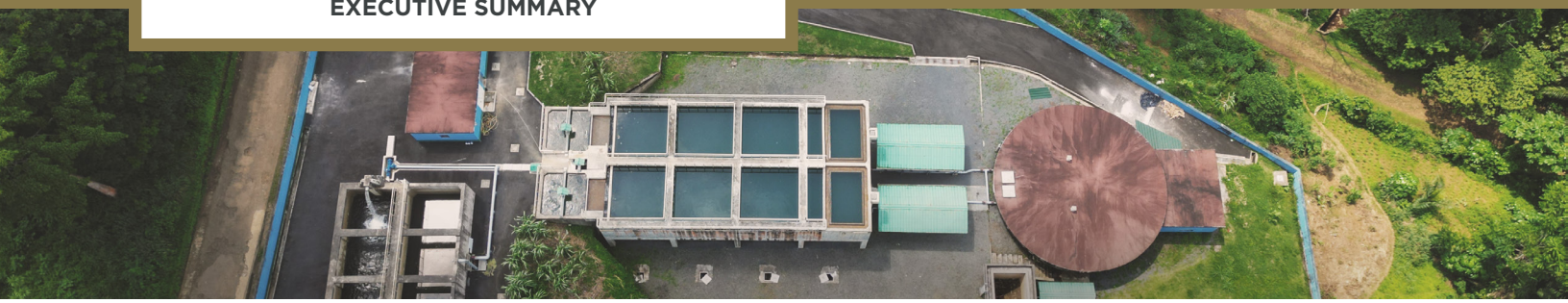


The electricity generation sector is the largest emitter of carbon dioxide (CO¬2), accounting for 48 percent of total emissions, followed by transport with 43 percent and the residential sector with 9 percent. Within transport, road transport was the largest emitter, accounting for about 76 percent of all sector emissions at 34.3 kilotonnes of carbon dioxide equivalent (ktCO2e), far exceeding maritime (7.02 ktCO2e) and air (3.83 ktCO2e). The updated Nationally Determined Contribution (NDC) for STP includes a conditional mitigation target to be implemented with external support, indicating that STP will reduce around 109 gigagrams of carbon dioxide equivalent (GgCO2e) by 2030 (equal to 27 percent emission reductions compared to its 2030 projected business-as-usual emissions).

Universal access to electricity (Sustainable Development Goal or SDG 7)—a critical factor for effective service delivery and economic growth—is within reach in STP, with an access rate of 84 percent. However, the energy sector is also the largest contributor to fiscal deficits in the country. There are significant technical and commercial losses estimated at 33 percent and the public water and electricity utility, Empresa de Água e Eletricidade (EMAE), has been taking steps to address these losses, including through regularization of customers and installation of meters. The government has also completed some hard reforms toward addressing challenges in the energy sector. Fuel prices were adjusted in 2023, removing explicit subsidies even though automatic price adjustment is yet to be applied. The total installed capacity in STP's interconnected grid is 38 megawatt (MW), of which 2.0 MW is hydroelectric power and the remaining 36 MW are diesel-based plants, resulting in high production costs and increasing the government's debt obligation.

The transport sector is the second largest contributor to emissions, of which the road subsector is the largest emitter compared to air and maritime transport. The vehicle fleet is obsolete, with some taxis over 40 years old. In addition, according to the fuel roadmap, imported fuels do not have an acceptable quality standard. Fuel economy and emission reduction are intrinsically linked to fuel quality. The creation of incentives for the replacement of old vehicles with more efficient and less polluting models and the implementation of electric mobility are crucial measures to ensure decarbonization in the transport sector.

In 2021, household air pollution from solid fuels in STP was responsible for 108 deaths and 3,410 disability-adjusted life years (DALYs). Without government intervention to enhance access to clean cooking by 2030, it is projected that household air pollution from solid fuels will result in 99 deaths and 4,382 DALYs. Kerosene and three-stone stoves are still the most widely used cooking systems in STP, but there is a rapid introduction of liquified petroleum gas (LPG), especially in urban areas (LPG is not easily accessible in rural areas). The ultimate goal of improving access to modern cooking technology solutions is providing clean, convenient, efficient, affordable, and safe options with readily available fuel for all households.

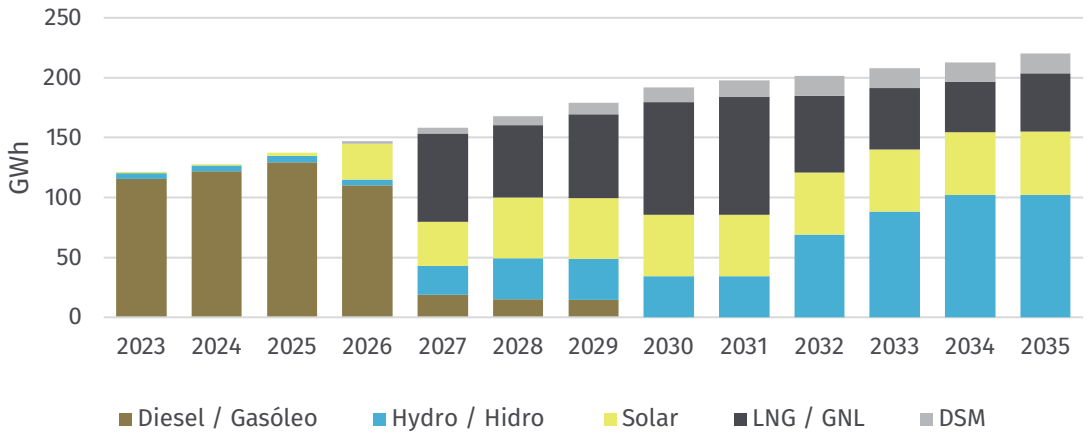


A Cleaner, More Sustainable Energy Mix as the Foundation of the Transition

The decarbonization of the electricity sector is expected to be the primary driver in reducing emissions and achieving STP's 2030 targets. Additionally, the electricity sector will not reach financial sustainability without a drastic shift from the use of imported diesel. Consumers cannot afford the resultant high cost of generation necessitating continued government subsidies. Therefore, the objective is to eliminate the use of diesel for power generation by 2030. STP has committed to achieving a 50 percent renewable energy target in its electricity mix by 2030. A review of the generation expansion program shows that STP can surpass this goal with a projected renewable share of 51 percent in 2030. The country's long-term generation planning outlines a steady growth of renewable energy sources starting from 2026, progressively phasing out diesel and substituting it with a diversified mix of solar, hydro, and liquified natural gas (LNG) as shown in figure ES.1. The deployment of energy efficiency measures completements these generation sources.

FIGURE ES.1

Projected Electricity Generation for São Tomé and Príncipe, 2023–2035



Source: GoSTP 2024.
Note: DSM = demand-side management; GWh = gigawatt hour; LNG = liquefied natural gas.

Reducing Fuel Consumption in Transport

There are several tools that can be immediately deployed to reduce emissions from the transport sector and contribute to decreasing fuel imports as part of the energy transition. The priorities are to set vehicle emission standards and to set vehicle age restrictions to reduce fuel use. Establishing a national age cap for vehicles will have an immediate impact. For instance, a 25-year vehicle age restriction leads to an 8.6 liters per kilometer (l/100km) fuel economy. This would result in 61,300 tonnes of carbon dioxide equivalent (tCO2e) annual emissions, and a 3,300 tCO2e reduction in 15 years, aligned with the 2040 target of reducing the average fuel consumption of the fleet to 5.5 l/100 km. To support compliance, a vehicle inspection center will be established under the supervision of the National Institute of Land Transportation (Instituto Nacional dos Transportes Terrestres – INTT) to assess the condition of vehicles, penalize those that are older than 20 years, and maintain control over the country's vehicle fleet.

Developing an Enabling Environment for Clean Cooking

To achieve the clean cooking targets outlined in the National Action Plan on Clean and Modern Cooking (PNACLM), the government aims to develop a strong policy and regulatory framework to ensure affordable and accessible cooking fuels. This includes establishing a dedicated clean cooking unit within the Ministry of Infrastructure and Natural Resources (Ministério das Infraestruturas e Recursos Naturais – MIRN), staffed by domestic energy experts or trained professionals. This unit would manage clean cooking initiatives, monitor related data, and coordinate with sectors such as health, gender, and industry, and relevant stakeholders. On the fiscal policy side, the government will promote the adoption of LPG for cooking. These subsidies will revert to LPG, as well as the associated equipment (gas stoves) to ensure that vulnerable and lower-income households can adopt this technology. The government is also committed to promoting the use of charcoal and sustainable charcoal, as well as improved high-quality wood stoves.

Financing the Transition

The decarbonization plan requires significant investments, estimated at US$390 million. STP's plan is to use and blend climate funds as well as traditional and nontraditional development aid to maximize private capital. The financing strategy will optimize risk allocation between government (public financing) and private capital to minimize project risks and maximize competition and efficiency. Total public investment is estimated at US$130 million, with US$260 from the private sector, including households over the next 10 years. Various sources of funding will need to be used jointly and complementarily to achieve full decarbonization. This includes reducing financial losses by improving sector performance, better managing sector revenue, increasing sector

revenue, raising climate finance, and counting on the support of traditional and nontraditional partners.

In the electricity sector, investment needs are estimated at US$288 million, comprising US$257 million for generation investments (of which US$26 million has been secured) and US$31 million in additional network investments. Of the remaining US$262 million, public investment needs are estimated at US$95 million for the project's cost preparation, preliminary engineering, land acquisition and compensation as needed, transaction advisory services, financial incentives, network investment, and capital expenditure contributions. These investments will result in savings of over US$600 million over the next 8–10 years.

Total estimated costs for cleaner mobility to support the energy transition over the next 10 years is approximately US$98 million. Government contribution is approximately US$28 million, which includes running costs for road maintenance and incentives. Near-term financing needs are relatively low as proposed actions are more focused on policy development and do not include much-needed road construction projects. The establishment of a vehicle inspection center will also be prioritized in the near term at an estimated cost of US$3 million.

Reaching the clean cooking targets outlined in the 2024 PNACLM (50 percent of ≤Tier 2 with firewood and charcoal and 50 percent of ≤Tier 4 with LPG and electricity) by 2030 requires a total investment of approximately US$4.4 million per year. This includes a public investment need of US$1.1 million per year to make clean cooking solutions affordable to poor and vulnerable households, unlock private sector involvement, and support the clean cooking market.

Policies to Drive the Transition

STP is committed to developing and enacting legal instruments that support its ambitious decarbonization agenda throughout the remainder of 2024 and into the following years. For example, in 2023, STP enacted decree-law 4/2023, which exempts customs duties on the imports of solar photovoltaic (PV) panels, inverters, and other system components that directly encourages both on-grid and off-grid renewable energy generation. Legislation has also been passed to increase import duty on inefficient lamps and eliminate duties and taxes for LPG imports. Technical standards and regulation will also be developed to define requirements for fossil fuel quality.

Commitment has been shown at the highest level of government toward the implementation of the action plan. Success relies heavily on the ability to raise funding, but strong leadership is required to set the right regulatory environment and implement projects at a satisfactory pace. An energy crisis committee has been established under the Office of the Prime Minister to monitor progress on all activities aimed at resolving the overdependence on diesel usage and its consequent challenges.

PADRES is ambitious, with the objectives of transitioning away from diesel for power generation by 2030 from a current base of 96 percent, increasing access to clean cooking (Tier 3 and 4) to 50 percent from a base of under 10 percent, and introducing age limits on vehicles. However, the scale of the challenge makes it surmountable. The priority is to develop the necessary policy base while raising funds for the plan of action. The critical actions are highlighted in table ES.1.

TABLE ES.1

The Plan of Actions for the Decarbonization and Resilience of the Energy Sector (PADRES) Roadmap

ACTION	YEAR (ready by)
POLICY ACTIONS AND INSTITUTIONAL STRENGTHENING	
Electricity sector	
Pass regulation on embedded generation.	2024
Revise the Electricity Sector Legal Regime (Decree-Law 26/2014) to address private sector participation.	2025
Apply the approved tariff methodology to gradually adjust tariffs.	2025
Pass regulation on participation and access rights of independent power producers (IPPs).	2024
Publish technical standards and grid code for safe and reliable operation and expansion of both the low voltage (LV) and medium voltage (MV) networks.	2024
Pass import regulation for lamps, refrigerators, and air conditioners.	2025
Introduce private sector in the operations and/or commercial business of Empresa de Água e Eletricidade (EMAE).	2026
Operationalize escrow account to improve management of sector revenue.	2025
Transport	
Develop technical standards and regulations for fossil fuel quality.	2026
Pass second-hand vehicle import regulations.	2026
Develop demand-side measures that aim to encourage and enable users to buy and operate electric vehicles (EVs).	2026
Develop supply-side measures to support local market establishment; offset the use of fossil fuels; discourage polluting vehicles; and standardize the import, registration, and use of vehicles.	2026
Clean cooking	
Strengthen the General Directorate of Natural Resources and Energy's (DGRNE) role in overseeing the clean cooking sector through the setup of a dedicated team.	2025
Enforce the forestry code with penalties for noncompliance.	2026

ACTION	YEAR (ready by)
INVESTIMENTOS	
Electricity	
Scatec lease: Letter of intent signed. Finalize power purchase agreement and project. Complete site preparation and interconnection lines under World Bank Accelerating Sustainable and Clean Energy Access Transformation (ASCENT) Program.	2025
Agua Casada Solar independent power producer (IPP): Feasibility and environmental and social impact assessment (ESIA) completed. Hiring transaction advisor. Launch competitive tender for 15MWp (megawatt peak) IPP.	2025
Battery storage: Feasibility study completed. Complete engineering and launch tenders for procurement of first batch with public financing.	2025
Rehabilitation of Guegue and Agostinho Neto: Prefeasibility study completed. Secure financing and initiate feasibility and project preparation for implementation as IPP.	2026
Biomass: Scoping study completed. Secure financing for prefeasibility and feasibility study including fuel availability, secondary and primary usage, for implementation as IPP.	2026
Lo Grande and Bombain: Prefeasibility study and financing structure developed. Prepare detailed feasibility study, ESIA, and project preparation for implementation as IPP.	2026
Claudino Faro: Prefeasibility study completed. Secure financing for feasibility study and project preparation for implementation as IPP.	2026
Gas plant: Agreement reached with developer for generation capacity. Carry out study on gas supply options. Feasibility study or ESIA for gas facility. Tender for gas supplier.	2025
Contador expansion: Studies completed but no funding available. Raise funding	2024-2025
Rooftop solar program: Pass regulation to allow embedded generation. Raise financing for incentives (such as net-metering and feed-in tariff).	2024-2026
Energy efficiency: Light-emitting diode (LED) lamp rollout at 70 percent. Develop scheme and raise financing for incentives for appliance efficiency program.	2026
Príncipe Solar: Feasibility study underway. Financing being considered by AfDB. Launch tender for installation.	2025
30 kV network expansion: Funding secured with World Bank. Owner's engineer for implementation being selected. Tendering for works.	2025
63 kV network: No funding secured. Prepare feasibility and environmental and social studies.	2027
Papagaio hydropower plant: Feasibility study underway. Financing being considered by the African Development Bank (AfDB). Launch tender for installation.	2025
TRANSPORT	
Vehicle inspection center: Prepare studies and raise financing for construction of a vehicle inspection center.	2027
CLEAN COOKING	
Clean cooking incentives: Design scheme and raise financing for incentives for clean cooking.	2025–2027

Source: GoSTP 2024.
Note: -> = Upcoming activity.

I DECARBONIZATION FOR ECONOMIC RESILIENCE

One of 39 SIDS[1], STP is classified by the United Nations as a Least Developed Country (LDC). SIDS are uniquely vulnerable to climate risks––which can lead to loss of life and heavy economic losses––as well as to global economic shocks. STP is located on the Equator in the Gulf of Guinea off the coast of West Africa. It consists of two small islands and several islets and is a country of untapped natural wealth, with a striking volcanic landscape that is home to virgin rainforests and rich biodiversity. The island of Príncipe was recently recognized as a UNESCO Biosphere Reserve. The total area is 1,001 km2, with the island of São Tomé and its adjacent islets having 859 km2 of surface and the island of Príncipe, including the adjacent islets, 142 km2. The country comprises an Exclusive Economic Zone of a maritime extension of 170,000 km2.

Like many other tropical countries, STP's varied terrain, ranging from Pico de São Tomé at 2,204 m to coastal plains, gives the country a diversity of ecosystems, including rich forests with dense and luxuriant vegetation cover, productive agricultural land, and a comprehensive inland water system. Settled in the 1470s as a hub for trade with the surrounding countries, STP can once again serve as a commercial hub for populations that are accessible by the Atlantic Ocean.

Like many other SIDS, STP faces the challenges of a remote location and geographic isolation, which impact the country through high costs for the import and export of goods as well as international transport and logistics. Factors like small population size, remoteness from international markets, high transportation costs, vulnerability to exogenous economic shocks and fragile land and marine ecosystems make SIDS particularly vulnerable to biodiversity loss and climate change because they lack economic alternatives. STP contributes negligibly to global warming (and is a carbon sink) and has limited mitigation potential.

1 See more about SIDS at https://www.un.org/ohrlls/content/about-small-island-developing-states.

STP is highly dependent on imported diesel, which is used for 97 percent of its current electricity production. Fuel costs depend on and fluctuate according to international prices as the country's average monthly import bill for all uses is in the range of US$5 million. The sector weighs heavily on the state budget with the government contributing as much as US$7 million in recent quarters toward fuel purchases for electricity generation alone (World Bank 2023). End-user electricity tariffs are high (US$0.22 per kWh), but still well below the cost of generation (US$0.34 per kWh).

STP is motivated to capitalize on its renewable energy resources to mitigate and adapt to its climate-induced vulnerabilities while ensuring energy security and sustainable socioeconomic growth. The country's twin concerns about the health of its economy and addressing climate-related risks and opportunities have informed the government's initiative to prepare this strategic action plan. The plan focuses on greening the energy mix by investing in renewable energy and reducing STP's reliance on diesel imports with the objective of increasing the flexibility of the energy system and contributing to the country's resilience.

The PADRES offers a comprehensive and progressive vision toward 2030 and 2035, defining the steps to a clean and sustainable energy future as the basis of the country's long-term transformation to a resilient economy. It includes a time-bound roadmap that lays out the government's concrete and tangible priorities to transition from the use of diesel toward cheaper, more sustainable, and greener electricity generation; reduce fuel use in the transport sector; and improve health outcomes through clean cooking technologies and fuels.

A Young Population with Potential

STP has population of about 223,561 people with a near-equal split between males and females. Nearly a quarter of the population lives in the capital city of São Tomé. More than 60 percent of the population is under age 25 as of 2020, and life expectancy at birth is 67.7 years. STP's demographic projections for 2012–2035, made by the National Institute of Statistics, indicate that the national population in 2030 will be approximately 258,000 inhabitants.

The National Institute for the Promotion of Gender Equality (Instituto Nacional para Promoção da Igualdade Equidade de Género – INPIEG) conducts activities to promote women and gender equality and equity in the country. Its main responsibility is to ensure that the government's policy on gender integration, equality, and equity––the National Strategy for Gender Equality and Equity (Estratégia Nacional para a Igualdade e Equidade de Género)––is properly executed and implemented[2] to: provide for and ensure the economic promotion of women in rural and urban areas; provide for and ensure the promotion of equality and equity in education and training; improve the health status and sexual reproductive health of young adolescents and women; strengthen the application of women's rights and participation in decision-making; and, strengthen the intervention capacities of institutional mechanisms in favor of gender equality and equity.

2 Decree Law no. 23/2014, extracted from http://extwprlegs1.fao.org/docs/pdf/sao148518.pdf and INPIEG's Facebook page, https://www.facebook.com/pg/Instituto-Nacional-para-Promoção-da-Igualdade-e-Equidade-de-Género-STP-216091491829859/about/.

Consequently, STP has been successful in providing an adequate legal framework, implementing the strategies and action plans adopted, and raising public awareness of the importance of gender equality and promotion of sustainable development. However, there is still room for improvement in the promotion of gender equality across society (Instituto Camões 2017). In particular, in the energy sector, there is a need at all levels for better integration of gender issues (for example, they have not been particularly considered in most energy-related policies and regulations due to unfamiliarity with the experience of other SIDS and LDCs).

Geographically Isolated with a Small Market

Like many other SIDS, STP faces challenges due to its small size and remoteness and relative poverty. Some of the key challenges facing the country include:

- **Dependence on fossil fuels.** STP relies primarily on imported fossil fuels such as oil and diesel for energy production. This makes the country vulnerable to fluctuations in the prices of these fuels and increases its carbon footprint.
- **Limited infrastructure.** While the overall access rate is 87 percent, many rural areas are still without reliable access to electricity. The limited network also makes it difficult to supply energy to the entire population and limits the country's development.

The development of domestic renewable resources can help address both concerns by ensuring that last-mile connections in rural areas can be made without costly grid extension projects and reducing the reliance on fuel importation. Doing so will help STP ensure a more reliable, affordable, and sustainable energy supply for its population.

Responding to Climate Change

STP's Constitution holds that Saotomean men and women have the right to a healthy and sustainable environment. STP's climate is humid-tropical, and there are two seasons: an eight-month rainy season that occurs between September and May and a dry season called Gravana that occurs between June and August of each year. Rainfall is intense almost all year round. The average annual rainfall in the country exceeds 2,000 mm and can reach 7,000 mm at the highest points. The rivers and streams of the archipelago constitute a radial hydrographic network with springs in the mountains located in the center of the islands that feed the different hydrographic basins and an important number of aquifers. Consistent year-round rain ensures torrential rivers, while the steep volcanic terrain provides a topography that is suitable for hydropower.

Wind speeds, according to data from the National Institute of Meteorology (Instituto Nacional de Metereóloga), usually varies between 2.5 m/s and 6.3 m/s, with the southern part of the island of São Tomé being the most dominated by wind. The average solar radiation is 4.25 kWh/m2/day throughout the territory. The capital, São Tomé, the largest and most densely populated urban center and consumer of power, is located in some of the highest-quality solar resource areas.[3]

3 See solar resource maps at https://solargis.com/resources/free-maps-and-gis-data?locality=sao-tome-and-principe.

Like many other tropical countries, STP is rich in flora and fauna, particularly endemic species. However, like many SIDS and low-income countries, it is vulnerable to decreased rainfall and the consequent reduction in river flows; increased coastal erosion and flooding; loss of biodiversity; pollution of rivers, streams, and springs by chemical products; chaotic expansion of urban areas leading to deforestation and forest degradation; and the use of areas with agricultural potential for other purposes that degrade the soil.

To address these climate threats, STP's response is headed by the National Committee for Climate Change (CNMC), part of the presidency of the republic, that brings together the presidency, the government, the ministries, and technical directorates to raise awareness of climate change, develop and manage adaptation and mitigation policies and measures, and train relevant personnel. STP is a member of the United Nations Framework Convention on Climate Change and ratified the Kyoto Protocol in 2008, showing its commitment to combating climate change and its harmful effects. STP also signed the Paris Agreement in 2015, showing continued commitment to dealing with climate change and combating its consequences.

STP has already seen an accelerated pace of sea level rise causing severe degradation and coastal salinization, increased incidence of flash floods, and more intense extreme weather events. These effects jeopardize development initiatives aimed at alleviating poverty, promoting sustainable development, and building a more resilient nation, as envisioned in STP's 2030 Vision.

In its Third National Communication on national inventories of greenhouse gases (GHGs), STP found that the electricity generation sector is the largest emitter of CO¬2, accounting for 48 percent of total emissions, followed by transport with 43 percent and the residential sector with 9 percent (UNFCCC 2019). Within transport, road transport was the largest emitter, accounting for about 76 percent of all sector emissions at 34.3 ktCO2e, far exceeding maritime (7.02 ktCO2e) and air (3.83 ktCO2e). See figure 1.1.

These emissions are consistent with findings that over 95 percent of the country's electricity is produced through diesel thermal power plants and that the transport sector––particularly land transport, the second largest consumer of fuel––is heavily dependent on imported petrol and diesel fuels.

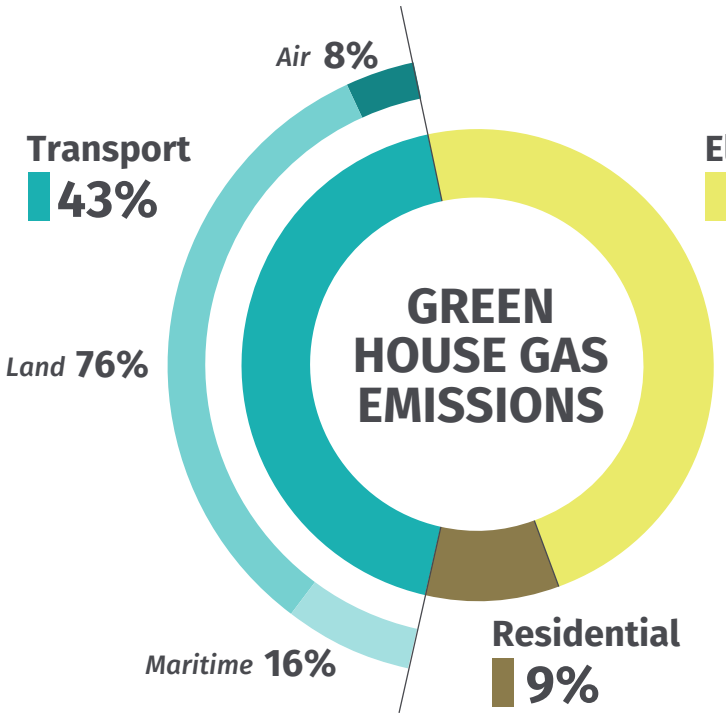


FIGURE 1.1
An Overview of Greenhouse Gas Emissions in São Tomé and Príncipe

Source: UNIDO 2023.

These sectors are therefore the priority areas for action as they represent the overwhelming share of total emissions for the country. As shown in table 1.1, the NDC, last updated in 2021, reflect these priorities. This update resulted in an increase in ambition and the number of mitigation, adaptation, and transversal measures, which grew from 18 to 29, with the prospect of expanding renewable energy production from 26 MW to 47 MW, as well as improving energy efficiency.

TABLE 1.1
Priority Areas in São Tomé and Príncipe's Nationally Determined Contribution (2021)

MEASURES	IMPACTS
Increase in the share of renewable energy in its energy production matrix	The updated NDC includes a conditional mitigation target to be implemented with external support, indicating that STP will reduce around 109 GgCO2e by 2030 (equivalent to 27 percent emissions reduction compared its 2030 business-as-usual projected emissions).
Reduction of losses in the network and improvement of energy efficiency	
Reducing carbon intensity in mobility	

Source: GoSTP 2021.
Note: GgCO2e = gigagrams of carbon dioxide equivalent; NDC = Nationally Determined Contribution; STP = São Tomé and Príncipe.

An Energy Sector at an Inflection Point

STP faces an acute macroeconomic and fiscal crisis marked by weak growth, high inflation, and depleted foreign exchange reserves. The economy is estimated to have contracted by 0.5 percent in 2023 (unlike in 2022, which saw 0.2 percent growth). The contraction is due to an aggravated fuel shortage and energy crisis, together with delays in the disbursement of external financing, which historically has fueled growth, accounting for an estimated 6.2 percent of gross domestic product (GDP) and 95 percent of capital expenditures in 2023. The fuel shortages were brought about by changes in the sources of fuel supply. Successive external shocks, coupled with the recurrent energy crisis, have led to severe macroeconomic imbalances, with a 2023 domestic primary fiscal deficit of 1.7 percent of GDP.

Universal access to electricity (SDG 7)—a critical factor for effective service delivery and economic growth—is within reach in STP, with an access rate of 84 percent. However, there are significant technical and commercial losses estimated at 33 percent. The public utility, EMAE, has been taking steps to address these losses, including through regularization of customers and installation of meters. On the other hand, end-user electricity tariffs (US$0.22 per kWh) are well below the cost of generation (US$0.34 per kWh).

These factors have triggered a severe fiscal crisis, where the energy sector is a major contributor to the stock of public debt (estimated at 84.3 percent of GDP in 2023) and the depletion of foreign reserves. Reducing diesel-based generation—to be replaced by cheaper and greener solutions—and improving sector performance are therefore critical steps to address the current fiscal crisis, requiring immediate and decisive action.

The government has completed some hard reforms toward addressing challenges in the energy sector. Fuel prices were adjusted in 2023, removing explicit subsidies even though automatic price adjustment is yet to be applied. Actions to improve financial sustainability and operational efficiency in the electricity sector include: adopting a methodology for establishing and periodically adjusting EMAE's revenue requirements; mandating EMAE to publish key performance indicators (KPIs); establishing import tariffs on incandescent light bulbs and import tariff exemptions for materials and equipment to be used in the production of renewable energy; and regularizing the commercial status of consumers without electric energy service contracts.

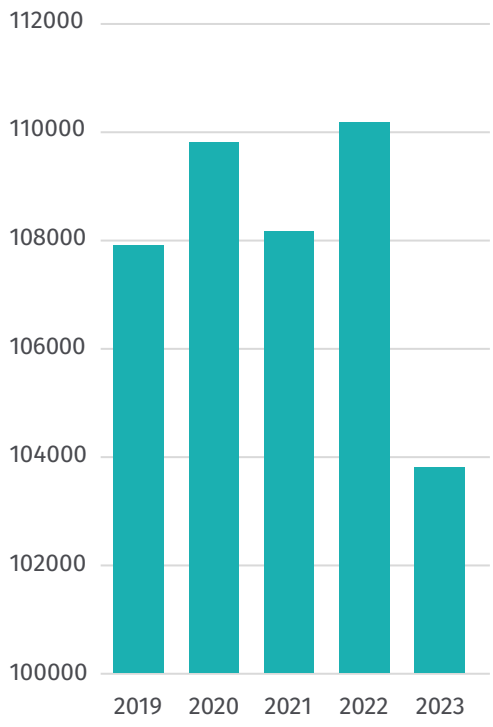
Generation is Dominated by Diesel Plants

Despite available hydropower and solar resources, STP's energy sector is still dependent on the most expensive, most polluting source of power: imported fossil fuels, usually diesel. At present, the country has a hydroelectric plant (Contador), five thermoelectric plants (Bobô-Forro 2, Santo Amaro 1, Santo Amaro 2, and Santo Amaro 3 and São Tomé) and a 0.540 MWp PV solar plant, five small, decentralized plants in Dona Augusta, Monte Mário, Ponta Baleia, Porto Alegre, and Ribeira Peixe, as well as the diesel plant in the Autonomous Region of Príncipe. In addition to these, there is the 10 MW diesel Tesla independent production plant, under a partnership with Tesla STP that started operating in December 2023. The total installed capacity in the interconnected grid in São Tomé is 38 MW, of which 2.0 MW is hydroelectric power and the remaining 36 MW are diesel-based plants,

resulting in high production costs and increasing the government's debt obligation through the importation of fuel and spare parts for generators. Although there is significant seasonal variation, the guaranteed availability in the system is only 19 MW, representing about 51 percent of the total installed power in the interconnected grid in São Tomé island. This does not provide sufficient reserve and consequently causes a supply-demand imbalance that is solved through a curtailment of demand or ends in a blackout. Figure 1.2 highlights STP's energy production over the past five years.

The annual electricity production of the country in the last 5 years has varied between 103 GWh and 111 GWh. Only 5 percent of electricity was from renewable energy sources, namely hydroelectric and solar generation. An ongoing energy efficiency campaign to replace incandescent light bulbs with energy-efficient LED lamps has made a visible difference in peak power consumption (an estimated change of 4 MW).

FIGURE 1.2 Historical Electricity Generation in MWh



Source: EMAE 2024.
Note: MWh = megawatt hour.

A Weak Grid, but Being Readied for an Energy Transition

Limited attention has been paid to the topology of the transmission and distribution network or the associated voltage levels. Currently, there is no clear distinction between the transmission and distribution networks in many sections of the electricity grid, which causes several organizational, structural, operational, technical, and functional constraints. The medium voltage (MV) network on São Tomé island has a length of 203 km overhead and 50 km underground lines. On Príncipe island, the MV network system is operated at a voltage level 6 kV and has a length of approximately 25 km.

The low voltage network system has an estimated length of more than 600 km, on São Tomé; on Príncipe, the low voltage (LV) system has a length of 50 km. Much of this network, especially on São Tomé, is still bare-wire and overloaded, which contribute to technical and commercial losses. The lack of a clear separation between the transmission and distribution networks makes it difficult to implement a coherent and effective electrical protection plan for the system. Failures are not contained and can propagate widely, causing instability in the system and considerable reduction in the quality of service. The network is not designed for the level of redundancy required to meet the desired n-1 criteria for proper reliability. Occasional blackouts occur, attributed to the sudden loss of large generation sources or transmission lines. The existing network is capacity-constrained due to inadequate reactive power at major load centers and transmission limitations. Without addressing these constraints, system operation will be more difficult with the introduction of large variable renewable energy (VRE) generation sources.

A final barrier that STP shares with regional countries is the need for more technical skills for system planning, operations and maintenance, and gender balance in the energy sector. The challenges of succession planning and staff retention have a negative impact on knowledge management and skills development, which affects network development and stability.

While the present connection fee is relatively modest, it is still prohibitive for poorer households. The country is committed to reaching universal electrification by 2030, including through off-grid initiatives and increased access to the network subsidized by the government. To support this goal, STP is committed to investing in:

- Building out mostly renewable generation to lower the cost of production;
- Standardizing, strengthening, and extending the transmission and distribution grids;
- Reducing demand by applying energy efficiency measures; and
- Improving both technical and administrative governance.

Transport Offers Opportunities for Decarbonization

In STP, the transport sector is the second largest contributor to emissions after the electricity sector. Some 80 percent of vehicles run on gasoline and another 17 percent on diesel. Reducing or eliminating these sources could significantly reduce STP's GHG emissions.

A Fleet of Aged, Inefficient Vehicles

The overall fleet size is small, with some 40,713 vehicles registered as of the end of 2023, though the fleet has grown by about 1,300 vehicles a year between 2010 and 2023 (figure 1.3). The average fleet age is about 25 years old, among the oldest in the world.

The fleet's average fuel economy is 8.4 l/100km (28 mpg), compared to an average of 7.1 l/100km (33 mpg) for developing countries and 6.0 l/100 km (39 mpg) in Europe. The Global Fuel Economy Initiative (GFEI) targets a global average fuel economy of 4.2 l/100km (56 mpg) by 2030, but this goal may not be achievable for countries like STP, considering that fuel economy in the Global South is expected to reach a minimum of 6.1 l/100km (39 mpg) by 2030. To achieve this GFEI target by 2030, countries in West Africa must achieve a fuel economy of 5 l/100km (47 mpg) by 2025. This is equivalent to achieving half of the current fuel economy (8 to 11 l/100 km, 29 to 21 mpg) by 2025.

Fuel economy is intrinsically linked to fuel quality. Out-of-specification fuels, containing excessive amounts of manganese and sulfur, lower heating values, and low octane ratings, in the case of gasoline, are detrimental to fuel economy. Unfortunately, the major exporters of fuels to STP have not yet complied with fuel quality requirements.

All vehicles in STP are imported. About 56 percent of vehicles were manufactured in Japan, while 89 percent of motorcycles came from China. The new vehicle fleet, which includes 3.6 percent of all vehicles, came from South African assembly plants and are already in the Euro 5 and 6 construction categories. Overall, 71.3 percent of vehicles are in the Euro 4 category or lower due to the absence of an age limit or fuel standards.

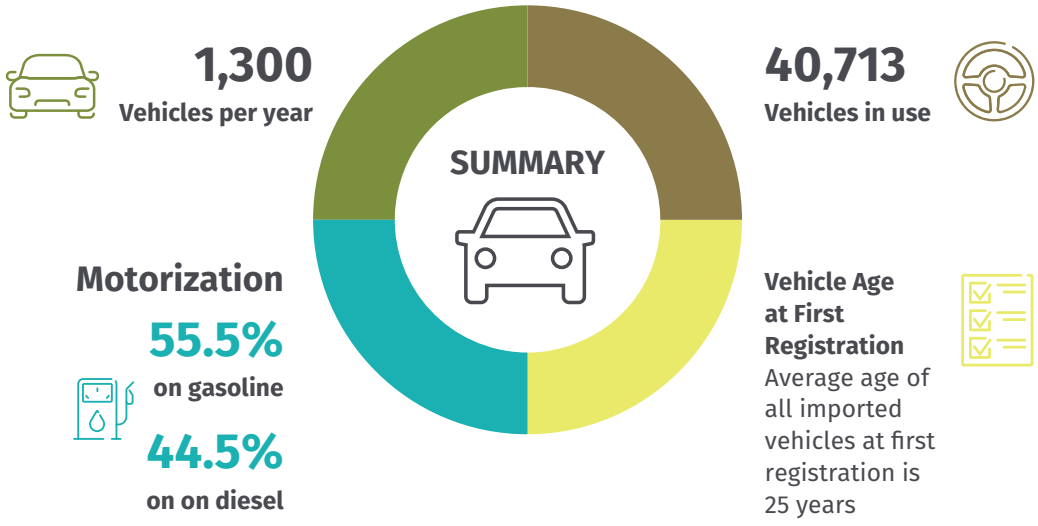


FIGURE 1.3
Overview of Vehicle Fleet in São Tomé and Príncipe

Source: UNIDO 2023.

Road transport in STP is largely dominated by light two-wheeled vehicles, as well as four-wheel personal and commercial vehicles. Together, these vehicles account for 95 percent of the market share. Heavy-duty vehicles account for around 5 percent of the total number of vehicles on the road. The market share of buses is very small (under 4 percent of the fleet) and trucks under 1 percent––suggesting vehicle ownership in STP is mostly individual and that there is scope to promote the adoption of public transport. A summary of the transport mix and average travel distance is shown in table 1.2. The table also highlights the charging needs of each vehicle segment if the median vehicle was electrified.

TABLE 1.2

Characteristics of Different Transportation Segments in São Tomé and Príncipe

VEHICLE CATHEGORIES							
	2 Wheels Personal	**2 Wheels -Commercial**	**3 Wheels**	**4 Wheels Personal**	**4 Wheels Commercial**	**Bus**	**Truck**
Usage	Personal	Commercial Fleet	Commercial Fleet	Personal	Commercial Fleet	Commercial Fleet	Commercial Fleet
Ownership	Single Owner	Single Owner/ Multiple Owners	Single Owner / Multiple Owners	Single Owner	Single Owner / Multiple Owners	Public / Private	Private
% Market Share	20%	18%	2%	35%	20%	4%	<1%
Travel Distance	Short (Avg. 20 km)	Medium (Avg. 35 km)	Medium (Avg. 35 km)	Short (Avg. 25 km)	Medium (Avg. 60 km)	Medium (Avg. 80 km)	Medium-Long (Avg. 200 km)
Charging Needs	Home/office charging meets most needs; daily charging may not be required.	Home/office charging meets most needs; daily charging may not be required.	**Fleet:** May require one or more charges daily; charging can occur at home, public stations, or fleet-dedicated stations.	Home/office charging meets most needs; daily charging may not be required.	**Fleet:** May require one or more charges daily; charging can occur at home, public stations, or fleet-dedicated stations.	**Large Battery Size:** Charging may occur at the terminal at the end of the day. **Small Battery Size:** Charging may occur along the route or at the terminal during waiting times.	**Large Battery Size:** Charging may occur at the depot at the end of the day. **Small Battery Size:** Charging may occur along the route or at the terminal during waiting times.

The electric mobility sector is still very new in the country. Outside of small carts used in hotels, there are only three electric vehicles (EVs) registered in the country as of 2024. While there have been many entrepreneurial initiatives to introduce EVs, they have not been successful and sustainable. Currently, the country imports mostly used vehicles for cost reasons. The bulk of the used marketplace is nonelectric. Even plug-in hybrid vehicles are relatively scarce in the used fleet. The population's low financial power makes the acquisition of EVs difficult. There is also a gap in the market for spare EV parts and qualified technicians. Even if these gaps are addressed, the success of electric mobility will depend on a more reliable and sustainable electricity supply.

Addressing these constraints will provide an opportunity for STP to realize the benefits of EVs as a part of the transition. With the implementation of fuel quality standards and car life limits, incentives for EVs will stimulate the development of the sector. Raising awareness about the benefits of EVs is key to accelerating their adoption. However, it is not sufficient to just focus on lower emissions, less dependence on fuel imports, and the availability of incentives. It is also important that EV buyers be aware of charging infrastructure and the lower long-term costs of ownership.

Access to Cleaner Cooking Options Must Increase

In 2021, household air pollution from solid fuels was responsible for 108 deaths and 3,410 DALYs in STP. Without government intervention to enhance access to clean cooking by 2030, it is projected that in 2030, household air pollution from solid fuels will result in 99 deaths and 4,382 DALYs.

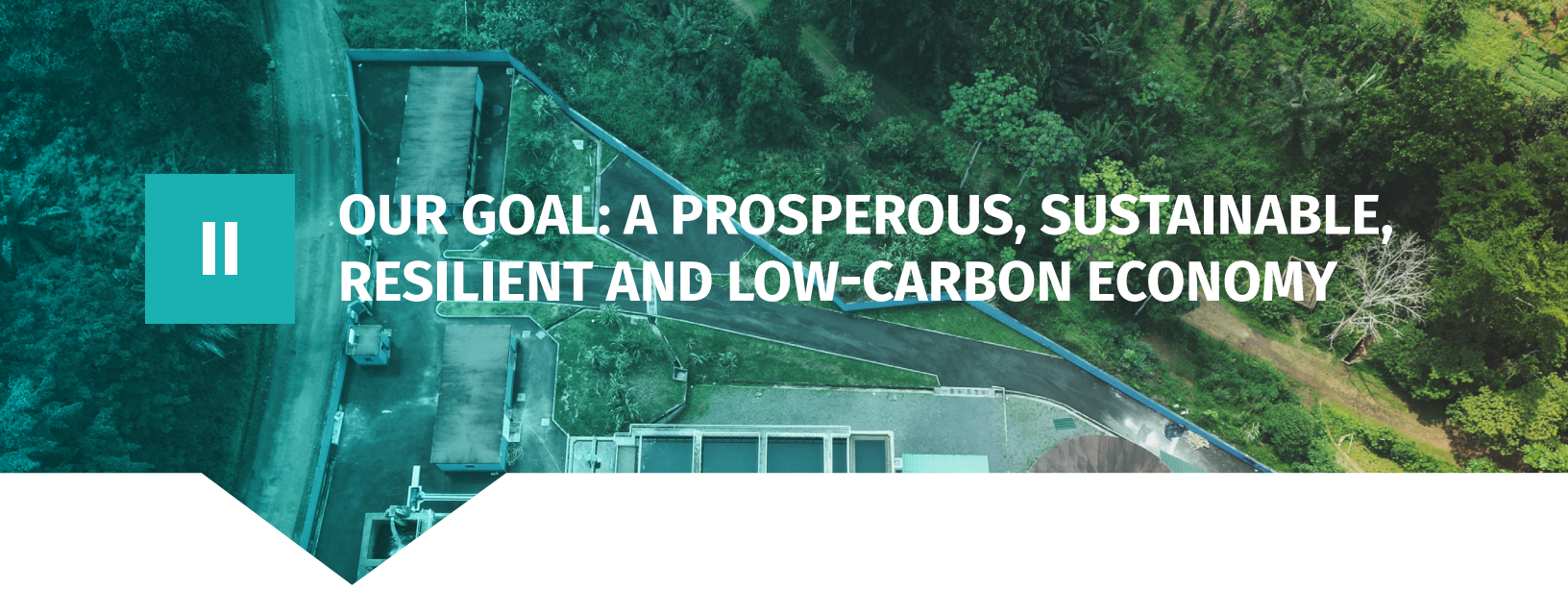
Kerosene and three-stone stoves are still the most widely used cooking systems in STP, but there is a rapid introduction of LPG, especially in urban areas (LPG is not easily accessible in rural areas). There was a significant increase in the use of LPG, from 1.2 percent to 18.89 percent, and a reduction in kerosene, from 53.5 percent to 43.07 percent, between 2019 and 2023, indicating that kerosene is rapidly being replaced by LPG. Most households use more than one cooking system (stacking). The penetration of improved stoves is low. There was no record of the use of other clean cooking equipment that is beginning to be used in an innovative way in developing countries, such as electric pressure cookers, solar electric stoves, or ethanol or bioethanol stoves.

There are differences between female-headed and male-headed households. Female-headed households use lower-level systems on the World Bank's Multi-Tier Framework (MTF) for Cooking initiative scale to a greater extent (World Bank 2020), with a higher proportion signaling the fact that cooking is expensive.

In STP, the primary challenge for improving clean cooking access is the prevalent use of kerosene across both urban and rural areas. Kerosene and solid fuels are deeply ingrained in household practices, necessitating a strategic approach to transitioning users to LPG, which is both cheaper and safer. This strategy should also focus on enhancing the efficiency of solid fuel appliances such as improved cookstoves (ICS) and promoting sustainable wood fuel production.

Developing an LPG pricing scheme that aligns with household incomes and avoiding substantial upfront costs is key to enabling families to benefit from the affordability and health advantages of LPG over kerosene. This suggests exploring options for consumers to buy LPG in smaller quantities (refills), making it more accessible to medium- and low-income households. Without this flexibility, LPG subsidies will be inefficient, primarily benefiting higher-income households that can afford the purchase of set minimal LPG quantities (that is, 3 kgs) and are less affected by the lack of flexibility of this fuel. Moreover, ensuring a reliable LPG supply is critical, particularly in an island state where logistical challenges can be more pronounced. Disrupted and intermittent supply will not lead to sustained use and adoption of LPG.

Furthermore, there is a low level of awareness among households regarding the health, climate, and gender benefits of clean cooking options (ICS). Addressing this lack of awareness is essential for promoting the adoption of cleaner cooking technologies. Political will and leadership to accelerate clean cooking access are prerequisites for the success of policy actions. The ultimate goal of improving access to modern cooking technology solutions is providing clean, convenient, efficient, affordable, and safe options with readily available fuel for all households.



II OUR GOAL: A PROSPEROUS, SUSTAINABLE, RESILIENT AND LOW-CARBON ECONOMY

A Cleaner, More Sustainable Energy Mix as the Foundation of the Transition

The adoption and implementation of renewable energy in the national energy mix, as well as implementing energy efficiency measures, remains constrained by a wide range of challenges related to local technology financing and availability, specific policy and regulation, institutional capacity, knowledge and awareness, qualification and certification, and experience. Each of these is a challenge that can be overcome, and STP has prepared a number of plans to do just that. These include its Vision 2030 document (GoSTP 2014), The Country We Need to Build (which also lays out development objectives to 2050) and the 2019 Transition Strategy for the Blue Economy in STP (GoSTP 2019a), which both inform regional strategies like Agenda 2063: The Africa We Want (AU 2020) and the 2050 Africa's Integrated Maritime Strategy (AU 2012) approved by the African Union in 2014.

Three concurrent plans were developed for electric supply: the National Action Plan for Renewable Energy (Plano de Acção Nacional no sector das Energias Renováveis – PANER), the National Action Plan for Energy Efficiency (Plano de Acção Nacional de Eficiência Energética – PANEE), and the Green Energy Acceleration Plan (Plano de Acção de Energia Verde – PAEV).

PANER defines a set of goals and measures to be implemented by 2030 and 2050 in order to contribute to the transition to a low-carbon economy. This includes achieving universal access to electricity by 2030 and ensuring that nearly 75 percent of the energy supply is from renewable sources: 49 percent solar PV, 18 percent hydropower, and 5 percent biomass.

Similarly, PANEE sets specific targets for energy efficiency in line with STP's published NDC. This includes an 8.7 percent reduction in energy demand by 2030 and 12.9 percent reduction by 2050.

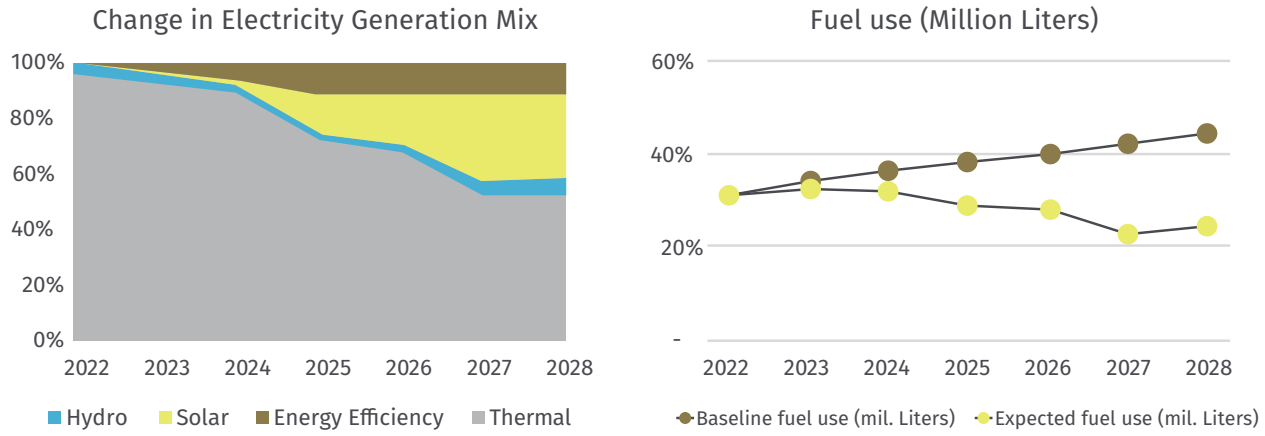
PAEV promotes sustainable development, a transition to a low-carbon economy, and the protection of natural resources. The plan brings together the recommended measures from PANER and PANEE and considers other complementary initiatives, such as micro- and mini-grids for

communities where the national electricity grid does not reach and cannot be extended economically, as well as programs to reduce the fuel bill and emissions for thermal power plants by replacing diesel with gas.

Ongoing projects will reduce thermal generation in the electricity production mix to just over 50 percent and lead to an important reduction in the government's fuel bill (with fuel use decreasing from a 2024 baseline level of 38 million liters to an estimated 23 million liters in 2028). See figure 2.1. A 2 MW solar PV plant is under construction, the full capacity of which is expected to be commissioned by December 2024. The government also intends to enter into an agreement with the International Finance Corporation (IFC) to deploy 11 MWp of solar PV energy, while funding has been secured from the World Bank for a 15 MWp solar PV plant through a public-private partnership.

FIGURE 2.1

Impact of Ongoing Projects on the Generation Mix and Fuel Consumption in São Tomé and Príncipe



Source: GoSTP 2024

Reducing Fuel Use in the Transport Sector as Part of the Transition

Decarbonizing the transport sector is crucial for reducing STP's overall emissions as well as decreasing the need for fuel importation by switching to alternative and more sustainable resources. Various plans have been reviewed by the government. Given rapid increases in fuel efficiency and electrification options, restricting the age of vehicles or establishing vehicle and fuel standards will help to save fuel and reduce import costs.

The growing concern about air quality and climate change makes it necessary to implement regulations and standards for fuels and automotive vehicles, especially older ones. On the other hand, the creation of incentives for the replacement of old vehicles with more efficient and less polluting models is crucial for ensuring the successful implementation of this plan. The approach can also be phased in using individual classes of vehicles. For example, STP's taxi fleet is very old––40 to 50 years old––and would experience outsize benefits from replacement.

The country has a 2040 target of reducing the average fuel consumption of its vehicle fleet to 5.5 l/100 km.

This will be driven by incorporating vehicle efficiency standards into the existing vehicle emissions regulation and the visual smoke rules.

Working Toward Transport Electrification as a Medium-Term Goal

In addition to establishing minimum fuel and vehicle standards, the government intends to take the opportunity to make a technological leap and use low-emission vehicles EVs in the country. In addition to reducing fuel import costs, EVs reduce local air and noise pollution, improving the health and well-being of the population.

The government intends to lead by example and focus on replacing public vehicles, including government- and municipal-owned vehicles, buses, and taxis with electric options. The Electric Mobility Roadmap of 2024 guides the country toward medium- and long-term goals for increasing the penetration of EVs.

The plan calls for the development of scenarios for future vehicle fuel mix through 2050 and the consequent impact on emissions relative to the business-as-usual scenario. Through sensitivity analysis of each transport segment, the plan calls for an assessment of the required EV penetration rate in order to meet desired limits on GHG emissions and fuel imports.

It is also not sufficient to focus solely on road transport. Given the prevalence of artisanal fishing, electric motors for boats and appropriate charging infrastructure at ports and docks can be explored to further reduce fuel use. A pilot project is currently being developed for Príncipe island.

Clean Cooking for Improved Health Outcomes as Part of the Transition

Kerosene and solid fuels are deeply ingrained in household practices, necessitating a strategic approach to transitioning users from kerosene to LPG, which is both cheaper and safer. This strategy should also focus on enhancing the efficiency of solid fuel appliances such as ICS and promoting sustainable wood fuel production, even as efforts are made to spread the use of LPG. This will increase efficiency and reduce indoor air pollution, which has a disproportionate impact on women and children who live, work, and play around these stoves.

Accordingly, the National Action Plan on Clean and Modern Cooking (Plano Nacional de Acção sobre Cozinha Limpa e Moderna – PNACLM), aligned with PANER and PANEE, has been developed to:

- Identify strategies and public policies to promote the adoption of clean and modern cooking products and services in the STP market, stimulating consumers and suppliers and generating local jobs and income;
- Guide decisions in the design of future projects and in the selection of potential beneficiaries of future interventions; and
- Review STP's commitments in the area of clean cooking and revise them from the traditional binary of "liquid fuels" versus "solid fuels" to align them with the MTF and SDG 7 and contribute to increasing international attention and support for this transformation by identifying potential sources of financing, with a target of achieving a Level 4 on the MTF by 2030.

The plan sets specific targets for ICS and modern and clean cooking solutions by 2030, including:

- 50 percent of the population uses MTF Level 2 or higher transition technologies with at least 20 percent energy efficiency
- 50 percent uses clean and modern MTF Level 4 or 5 solutions with at least 40 percent energy efficiency.

The government has instituted various incentives to support the expansion of access to clean cooking. LPG is exempt of all import duties and taxes while kerosene attracts a 13 percent subsidy per liter which is paid by the government to the National Fuel and Oil Company. While LPG adoption is growing, it needs to be expanded among vulnerable and poorer households by improving affordability and supply flexibility, such as through refilling stations.

III INVESTMENTS FOR THE SUSTAINABLE FUTURE OF STP

Eliminate the Use of Diesel for Electricity Generation by 2030

The decarbonization of the electricity sector is expected to be the primary driver in reducing emissions and achieving STP's 2030 targets. Additionally, the electricity sector will not reach financial sustainability without a drastic shift from the use of imported diesel. Consumers cannot afford the resultant high cost of generation necessitating continued government subsidies. The objective is therefore to eliminate the use of diesel for power generation by 2030. The capacity mix to achieve this objective is guided by four principles:

- Implementation period. The urgency calls for mature technologies that can be deployed in a timely and cost-effective manner.
- Strengthening adaptation and developing resilience. The capacity mix allows for the improvement of climate resilience through diversification and strengthening fiscal sustainability. The quality of solar resources is relatively low (1,375 kWh/kWp) and there are wide variations in hydrology driven by seasonal changes. Enhancing economic, financial, and climate resilience therefore requires diversifying generation sources, which will also guarantee the security of supply.
- Maximizing the use of renewable energy. The falling cost of solar PV and battery storage provide an option to decarbonize the sector and address crucial issues of energy security, affordability, and employment generation. It also improves the predictability of sector revenue as it insulates the cost of supply against fluctuations in the global market.
- Meeting climate commitments. The capacity mix will contribute to the achievement of NDC targets, enabling the overall emission reduction of 50 percent compared to the business-as-usual scenario by 2030.

Generation Planning for Decarbonization Targets

A review of the PAEV and the Least Cost Development Plan was carried out based on these principles. Solar PV (including rooftop systems), hydropower, and battery storage are strong renewable energy technologies

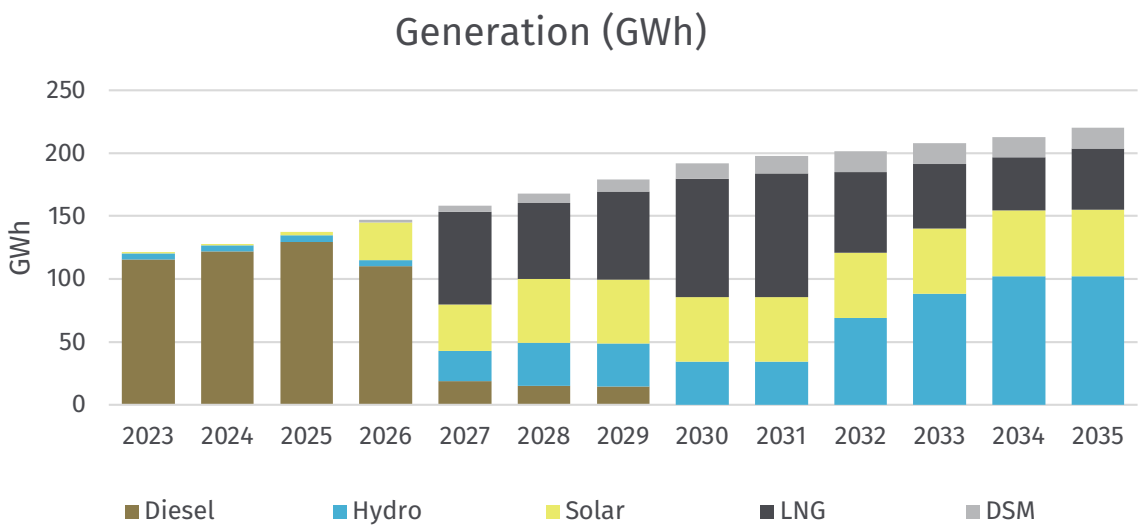
to be exploited to address critical challenges such as energy security and affordability. In addition to transitioning from diesel to cleaner energy sources, energy efficiency measures, particularly in buildings, will play a key role in the overall decarbonization strategy.

STP has committed to achieving a 50 percent renewable energy target in its electricity mix by 2030. A review of the generation expansion program shows that STP can surpass this goal with a projected renewable share of 51 percent in 2030. The country's long-term generation planning outlines a steady growth of renewable energy sources starting from 2026, progressively phasing out diesel and substituting it with a diversified mix of solar, hydro, and LNG. The deployment of energy efficiency measures completements these generation sources.

The initial energy mix heavily relies on diesel (96 percent), but from 2026, a gradual replacement of diesel with more sustainable and clean alternatives is projected (figure 3.1). As diesel is phased out, LNG and renewables are set to play a significant role in ensuring the country's energy needs are met.

FIGURE 3.1

Projected Electricity Generation for São Tomé and Príncipe, 2023–2035



Source: GoSTP 2024.
Note: DSM = demand-side management; GWh = gigawatt hour; LNG = liquefied natural gas.

Solar energy is anticipated to become the leading renewable energy source in STP between 2026 and 2032 before being overtaken by hydro power. By 2030 (when the phasing out of diesel is complete), the solar contribution will ramp up considerably, making up a significant portion of the energy mix. The progressive expansion of solar capacity aligns with the country's renewable energy targets, which will rely on the development of solar farms.

Hydropower is a critical component of the country's energy mix post-2026, dominating the mix from 2032 with the planned development of hydro projects such as lo Grande and Bombain (11.3 MW of capacity), surpassing solar PV and providing a reliable and consistent energy source during periods of low solar irradiance. The steady increase in hydro generation from 2026 to 2035 reflects this strategic integration.

LNG appears as a key transitional energy source in the phase-out of diesel. Although LNG plays an important role in the initial years, contributing a sizable portion to the energy mix, its share in the energy mix decreases as more hydro capacity is deployed. Costs assume the use of international intermodal containers that meet the standards specified by the International Organization for Standardization.

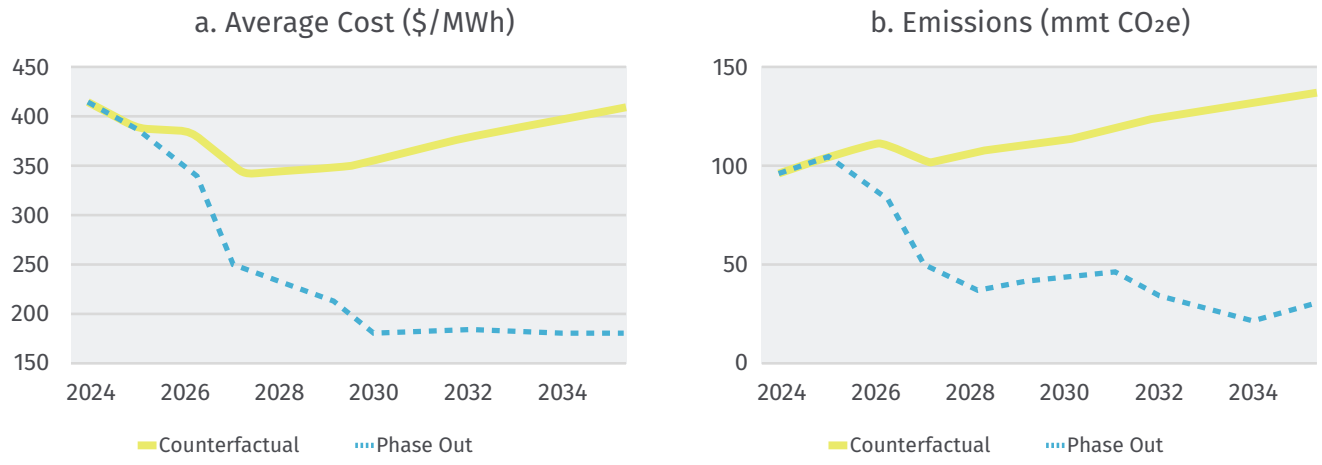
The planning also includes cost-based demand-side management (DSM) measures. The results show that these initiatives will contribute to reducing overall energy demand, thereby making the energy system more resilient and less dependent on fossil fuels. The implementation of DSM measures will focus on appliance efficiency, providing modest but vital contributions to the overall energy balance (saving 16.5 GWh in 2035).

The transition to a renewable energy–dominated system will have several cobenefits. The reduction in diesel dependency, as reflected in the diminishing share of diesel in electricity generation over the period considered, will decrease the need for diesel imports and reduce associated emissions from sea transportation. Furthermore, the shift to solar and hydro will foster greater energy security and provide long-term stability in electricity generation costs. Indeed, the cost of generation is expected to drop to US$0.177/kWh in 2035 (figure 3.2a), while emissions also decrease by 85 percent compared with the counterfactual in 2035 (figure 3.2b).

STP's path to achieving 50 percent renewables in the electricity mix by 2030 is well underway, through projects with secured financing for 15 MWp of solar PV capacity and an additional 1 MW of hydro. LNG serves as a bridge fuel. The planned energy transition highlights the country's commitment to sustainability, while recognizing the need for grid flexibility and investment in storage technologies to support the increasing share of intermittent renewable energy sources. Given the critical role of hydrogeneration and the lead time to prepare such projects, a concrete development plan is required and included as part of this program.

FIGURE 3.2

Evolution of Average Costs and Emissions in São Tomé and Príncipe, 2023–2035



Source: GoSTP 2024.
Note: Dmmt CO2e = million metric tons of carbon dioxide equivalent.

The Transition Considers Risks to Enhance Resilience

There are several risks that can derail the achievement of STP's transition plan for clean energy. Identifying these risks allows STP to mitigate their impacts.

Climate Variability

The energy sector is currently heavily reliant on fossil fuels, which represent 97 percent of the energy mix. Transitioning to renewable energy sources such as solar, run-of-river hydro, and battery energy storage systems (BESS), presents risks to energy security if not properly managed. The intermittent nature of solar energy and the seasonal variability of hydro resources may also introduce vulnerabilities.

Mitigating strategies:

A diversified energy mix incorporating solar, run-of-river hydro, and BESS, along with LNG, can progressively reduce fossil fuel dependence while maintaining energy security. The implementation of advanced forecasting systems will be used to further mitigate the risks of renewable energy intermittency by optimizing grid integration and enhancing energy availability predictions. Measurements will be carried out to properly assess variations in hydrology as part of the hydro development program.

Frequency Stability Risks

The high penetration of VRE reduces system inertia, creating risks to frequency stability.

Mitigating strategies:

Implementing BESS can provide fast-response frequency regulation. Additionally, the deployment of hydro power generation can help mitigate this risk.

Technology Risks

Many BESS are still relatively new, and some technologies using new materials are in early development or deployment stages. Lithium-ion battery technologies, for example, are inherently hazardous due to the materials they utilize, which could potentially react violently. Together with the expected increase in solar panels, disposal of electronic waste (e-waste) needs to be managed properly.

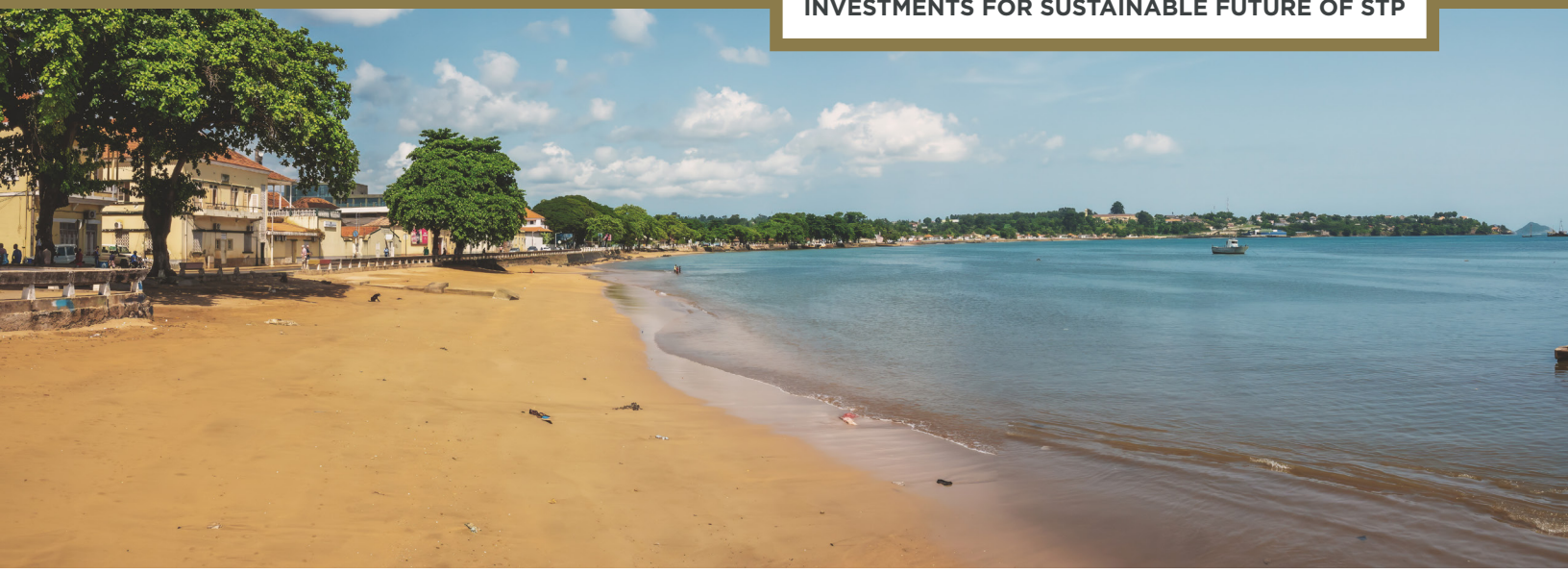
Mitigating strategies:

Proper planning, risk assessments, safe storage methods, and response protocols will help manage technology risks effectively. An e-waste management plan will be developed to manage such risks.

Enhancing Grid Flexibility and Reliability to Support VRE

The dilapidated state of the distribution network will hinder deployment of VRE. Funding has already been secured to upgrade the distribution network and make the grid smarter to improve operational performance. These investments are expected to reduce losses from over 33 percent at present to 30 percent by 2030 and 8 percent by 2050. Smart grid development will facilitate the deployment of transmission and distribution energy management systems for effective operation of the grid with high a penetration of VREs.

Such upgrades include weather and resource forecasting systems, expansion of the digital communication systems, upgrading of the central dispatch center, and reviewing the protection system across the network. Funding has also been secured to connect near-term solar PV capacity in Agua Casada to the PC5 substation and the national grid.



The new Supervisory Control and Data Acquisition system will prioritize robust security measures to protect against hacking attempts and unauthorized intrusions. This is essential to safeguard the integrity and reliability of the system. Additionally, the dispatch center will possess real-time control capabilities over the production units. This will enable efficient and effective management of the grid, allowing for dynamic adjustments and optimization of energy production based on the real-time demand and supply conditions.

Additional investments are required to support the goals of the decarbonization plan. With the expected growth in generation, a 63 kV transmission loop connecting generation centers and allowing proper operation of the network is needed to reduce the number of blackouts and brownouts. A total of 24 km of new 63 kV network is needed by 2035, as well as four new 63/30 kV substations.

Together, these investments will increase control capabilities, improve monitoring, increase flexibility of the system, and enhance security of network operations, resulting in improved the reliability of supply and quality of service.

Improving Operational Performance to Reduce Costs

Investing in Infrastructure

Improving the operational performance of the electricity sector is a shared responsibility of the government, its agencies, and consumers of electricity. Proposed actions cover all three actors, with the government in the leading role. There is commitment to speeding up the implementation of various initiatives being financed by the World Bank and the African Development Bank (AfDb). Key activities include: incorporation of a set of management information systems, comprising a commercial management system, an integrated distribution management system, and an enterprise resource planning system to support management of finances and all other corporate resources; implementation of the initial phase of a Revenue Protection Program for sustainable reduction of commercial losses in supply by installing advanced metering infrastructure to large customers (6,000 of them) to systematically record and monitor their consumption and ensure they are permanently billed according to their accurately metered full consumption; the installation of statistical smart meters on different

MV feeders to assess losses in different parts of the network and allow for the definition and prioritization of selective and effective loss reduction programs; and installation of fuel meters in all generating units operated by EMAE.

Private Sector Participation in Operation

Ongoing projects financed by development partners will provide hardware and infrastructure to improve the operational performance of EMAE. However, addressing electricity sector losses requires a holistic strategy encompassing internal management and operational procedures. In this regard, options to include private sector participation in the operations of EMAE is a relevant possibility. Under this approach, a private operator (concessionaire) will be responsible for either commercial operations or providing the distribution service, selling electricity, and covering its own operating costs. The concessionaire's remuneration is linked to its performance in key areas, like losses or percentage of energy billed.

Raising Consumer Awareness

Electricity theft is a leading cause of losses. A community awareness campaign can be highly effective in reducing the theft of electricity and promoting transparency by addressing both the behaviors and the attitudes of the community. The program will be revamped to enhance its impact in fighting nontechnical losses. This will explore the drivers and social norms that lead citizens to electricity theft and integrate gender-sensitive, community-centered interventions in the design and implementation of the proposed initiatives. These efforts will be integrated into EMAE's customer management systems to ensure full integration in operations.

Managing Consumption to Reduce Electricity Needs

Introduce Minimum Energy Performance Standards that Increase over Time

The replacement of inefficient lighting with LED lamps has confirmed the potential impact in reducing power consumption. To sustain results, there needs to be regulations to control the market for efficient and inefficient appliances. Policies will be introduced to phase out inefficient or old appliances that consume significantly more energy than modern equivalents in major electricity sectors like air conditioning, refrigeration, and lighting, with the introduction of buy-back, trade-in, or other scrapping programs.

Introduce Appliance Labels and Promotion Campaigns

Labeling and advertising are key tools that can nudge consumer behavior to encourage reducing power consumption (thus appliance running costs), even at the expense of slightly higher capital costs. Clear and consistent labeling that allows users to compare appliance efficiency will be paired with advertising in national media and at retailers to ensure that the benefits of any incremental improvement over the minimum is worth any additional up-front costs.

Reducing Fuel Consumption in Transport

There are several tools that can be immediately deployed to reduce emissions from the transport sector and contribute to reducing fuel imports as part of the energy transition.

Set Vehicle Emission Standards

STP has an aging fleet of vehicles with poor fuel economy, contributing significantly to the country's GHG emissions. Adopting Euro 4 fuel standards by 2026 and transitioning to Euro 5 and 6 in the following years would align STP with regional fuel economy targets and improve vehicle efficiency. This should be the minimum fuel standard for the country as all regional groups in Africa are moving toward AFRI 5 (Euro 4) fuel standard or its equivalent. Since it is challenging to assess compliance for used vehicles based on Euro standards, a 20-year age restriction will serve as a proxy standard for imports.

Set Vehicle Age Restrictions to Reduce Fuel Use

Establishing a national age cap for vehicles will have an immediate impact. For instance, a 25-year vehicle age restriction leads to an 8.6 l/100km fuel economy (figure 3.3a). According to figure 3.3b, an age restriction of 25 years would result in 61,300 tCO2e annual emissions, and a 3,300 tCO2e reduction in 15 years, aligned with the 2040 target of reducing the average fuel consumption of the fleet to 5.5 l/100 km.

A. Age Restriction and Fuel Economy Goals

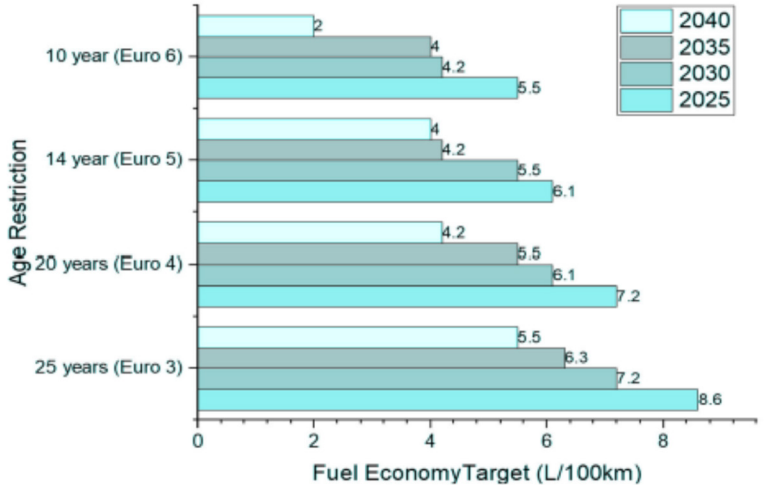
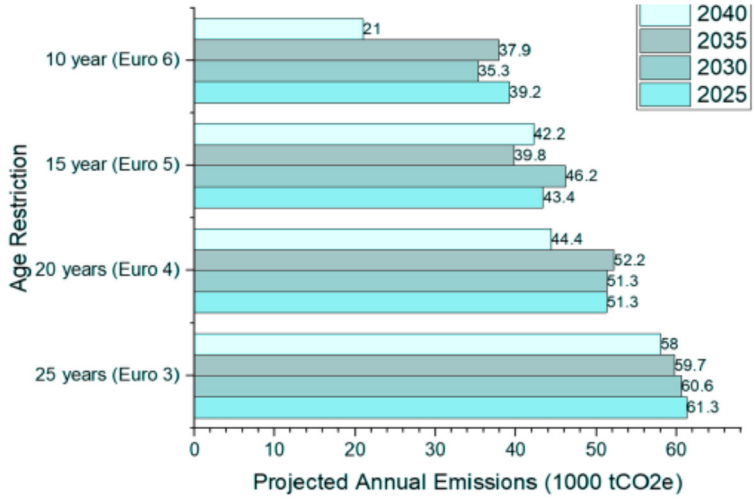


FIGURE 3.3
Effects of Vehicle Age Restrictions on Fuel Economy and Annual Emissions

Source: UNIDO 2023.

B. Age Restriction and Annual Emissions



Incentivize Low-Emission Vehicles

Reduce Taxes for More Efficient Vehicles and Adopt a Vehicle Scrapping Program

A vehicle scrapping program in STP would accelerate fleet replacement, especially taxis and vans that are over 40 years old. As recommended in the National Fuel Economy Roadmap for STP (MIRN 2023), there are successful examples from other countries such as Egypt, where the government passed a law in 2008 to replace taxis and microbuses over 20 years old. About 45,000 taxis were scrapped with a 25–30 percent price reduction on the new vehicle. A similar program can be implemented in STP from 2028, with a cost of approximately US$14,000 per vehicle for scrapping and recycling.

Subsidize the Purchase of Electric and Hybrid Vehicles

The following tax reductions and subsidies will be reviewed to incentivize electric and hybrid vehicles, especially for taxis and vans:

- **Reduction of custom duties.** For EVs and hybrid vehicles, the government could propose a reduction of custom duties in phases. Initially, a 0 percent duty on EV and hybrid imports could be proposed until 2025, gradually increasing to 15 percent by 2050. This initiative would reduce the upfront costs and make EVs more affordable.
- **Exemption of value-added tax (VAT).** Another proposal is to gradually exempt VAT for EVs until 2030, then 7.5 percent could be imposed to 2050, and 15 percent thereafter.
- **Registration and road tax exemptions.** EVs and hybrid vehicles could be exempt from vehicle registration fees and road taxes for the first 10 years of their use.
- **Subsidies for EV purchases.** Capital subsidy can be provided for EVs purchase (taxis and vans), linked to battery size. The subsidy is provided in initial years till 2030 and can be phased out later as EVs achieve price parity with combustion vehicles.

Develop and Enforce Vehicle Inspection Regulations

A vehicle inspection center will be established under the supervision of the National Institute of Land Transportation (Instituto Nacional dos Transportes Terrestres – INTT) to assess the condition of vehicles, penalize those that are older than 20 years, and maintain control over the country's vehicle fleet. Additionally, this center could regulate the entry of new vehicles into the country, ensuring they meet safety and environmental standards.

The vehicle inspection regulations for STP will be designed to align with the country's emission reduction goals, ensure proper enforcement by the vehicle inspection center, and establish the rules for data management. Any current regulations for vehicle inspection in STP should be reviewed and updated to include more rigorous standards related to energy efficiency, pollutant emissions, and road safety.

A Forward Look to Deepening Emission Reductions in the Transport Sector

More needs to be done to develop an analytical base to deepen emissions reduction in the transport sector. Studies will be carried out to inform additional policies that aim to maximize private sector investments in the transport sector.

- **Investment in public charging networks.** The development of fast-charging stations at key locations such as the airport or some parking lots to serve electrified tourist vehicles, taxis, and vans, will provide the required infrastructure to enhance the acquisition of EVs. This infrastructure must be supported by partnerships with the private sector and explore the inclusion of solar panels and alternative energy sources.
- **Incentives for installing charging points in homes and workplaces.** Subsidies for slower EV charging systems could be installed at individual homes and workplaces. Such subsidies could cover the actual charger hardware, connection costs to the local grid, add-ons such as solar or bidirectional capability, or all of the above.
- **Investment in infrastructure for cyclists and pedestrians.** Promote investment in safe infrastructure for cyclists and pedestrians, attractive to Saotomeans and tourists alike. This includes the construction of bike lanes, sidewalks, and safe pedestrian crossings, as well as ensuring accessibility for all. In addition, bike training courses for young people and women can be organized at local levels. The use and integration of electric bicycles can also be a solution for longer trips or tourists.
- **Urban planning policies that prioritize nonmotorized transportation.** Urban planning should focus on improving urban areas in STP by prioritizing walking, cycling, and other forms of nonmotorized transport. Improving motorized traffic management is key and can include implementing low traffic zones and initiatives that prioritize active mobility.
- **Traffic management.** Implement intelligent transport systems, coupled with congestion reduction policies.
- **Use of cyclologistics.** This involves using bicycles or cargo bikes for transporting goods, especially within urban areas. This environmentally friendly alternative to motorized delivery services can reduce emissions, ease traffic congestion, and promote local businesses.

Developing an Enabling Environment for Clean Cooking

To achieve the clean cooking targets outlined in the PNACLM, the government aims to develop a strong policy and regulatory framework to ensure affordable and accessible cooking fuels. This includes establishing a dedicated clean cooking unit within the MIRN, staffed by domestic energy experts or trained professionals. This unit would manage clean cooking initiatives, monitor related data, and coordinate with sectors such as health, gender, and industry, as well as other stakeholders.

The unit will advise on fiscal and policy measures to promote the clean cooking market, focusing on supporting cleaner fuels (LPG) and appliances (LPG stoves) over more polluting options like kerosene. Additionally, it will oversee the availability of transparent and updated data to inform clean cooking interventions and projects and conduct stakeholder engagement. In the medium to long term, this unit is expected to implement clean cooking projects, including monitoring and evaluating results where required. This will necessitate adequate human, financial, and technical resources.

On the fiscal policy side, the government aims to promote the adoption of LPG for cooking. The PNACLM identified kerosene, the most used fuel in STP, as nonviable due to the need for heavy subsidies and its environmental and health risks. Reallocating

kerosene subsidies to LPG and LPG stoves, which are cleaner options, could make these more accessible. This measure will be accompanied by the development of LPG refilling stations to ensure that LPG promotion includes lower-income and vulnerable households. Implementing targeted subsidies will require reinforcing institutional capacity and processes.

As the 2030 targets aim for 50 percent MTF Level 2 to 3 solutions, including improved charcoal and firewood stoves, and 50 percent adoption of modern cooking services like gas and electricity, LPG promotion will be paired with wood fuel regulation, developing and enforcing forestry codes to protect vulnerable tree species and reduce unsustainable logging. This includes requiring sustainable charcoal production through efficient charcoal mills in the forestry code and regulations. Noncompliance will result in penalties that will be used to help fund reforestation interventions and promote sustainable wood fuel practices.

Increase the Use of Energy-Efficient Improved Cookstoves

The 2030 clean cooking targets recognize the cultural significance of charcoal and firewood in Saotomean households. The 2019 MTF study revealed that over one-third of households relied on a mix of kerosene and traditional fuels, such as firewood, which are highly polluting. Even as kerosene users are likely to transition to LPG, it is equally important to provide energy-efficient solutions for firewood and charcoal users, like high-quality ICS. Currently, only 8 percent of households use ICS, primarily with charcoal, and the existing models do not meet Tier 2 or 3 energy efficiency standards. Improving the quality and availability of ICS is crucial for making these solutions more sustainable.

With 53.5 percent of the population dependent on biomass for cooking, there is significant potential to expand the ICS market, particularly given the importance of charcoal in local cuisine. Addressing past failures of ICS projects, such as a lack of market incentives for producers and limited public awareness of the benefits, will be key. The clean cooking unit should tackle these issues, complemented by awareness campaigns. Moreover, the government will partner with donors and development organizations (as outlined in the PNACLM) for technology transfer and testing, aiming to distribute high-quality ICS. Local artisanal production of ICS, in collaboration with technical partners, will be explored to meet the needs of STP's relatively small population.

Finally, charcoal and firewood production can also be improved. Regulating charcoal production by introducing more efficient methods, such as replacing traditional kilns with improved technologies like the Casamance kiln—offering around 10 percent greater energy efficiency—will be explored, adapted, and implemented locally.

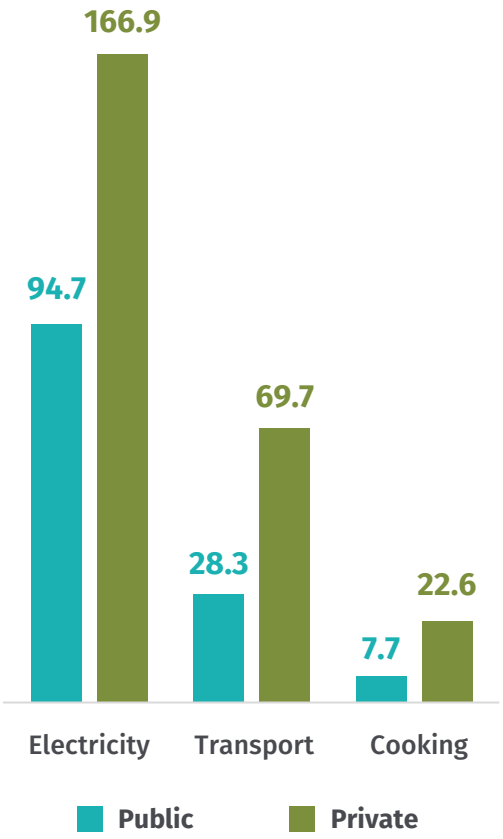
IV FINANCING THE TRANSITION

The decarbonization plan requires significant investments, estimated at US$390 million (figure 4.1). STP's plan is to use and blend climate funds as well as traditional and nontraditional development aid to maximize private capital. The financing strategy will optimize risk allocation between government (public financing) and private capital to minimize project risks and maximize competition and efficiency. Total public investment is estimated at US$130 million. The remaining US$260 will come from the private sector, including households, over the next 10 years.

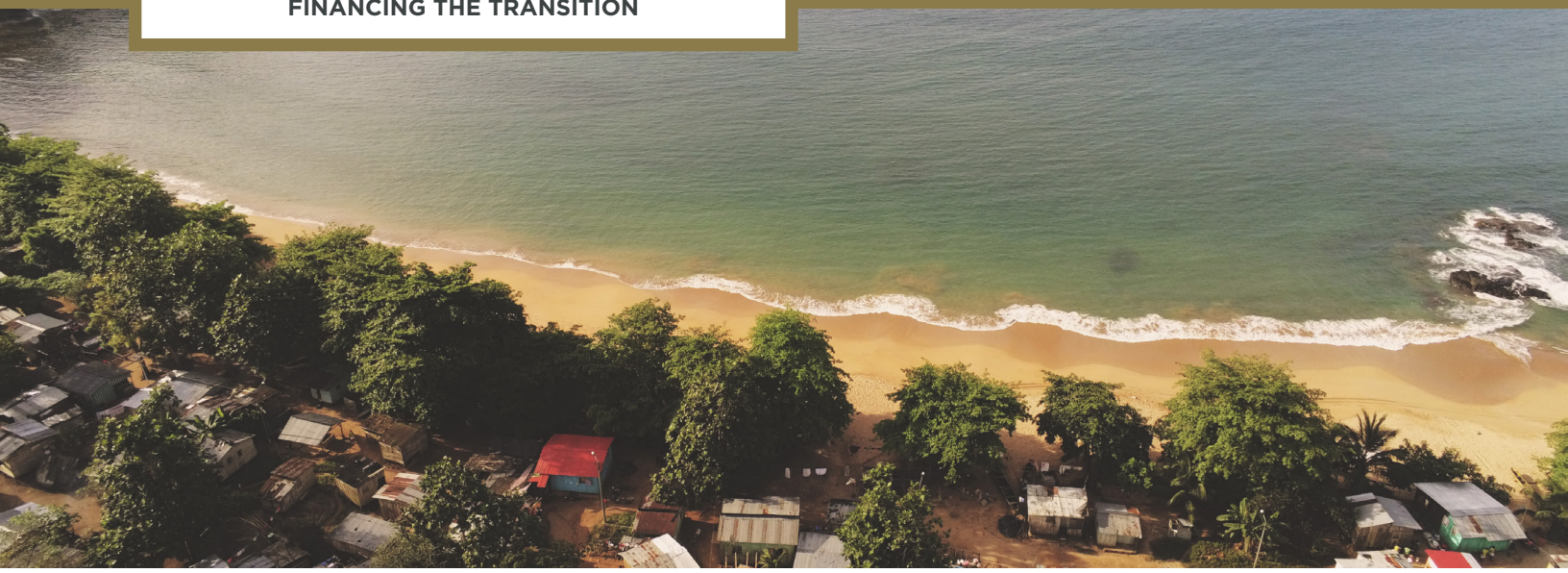
Financing Sustainable Energy

In the electricity sector, financing needs are estimated at US$288 million, comprising US$257 million for generation investments (of which US$26 million has been secured) and US$31 million in to strengthen the electricity network. Of the remaining US$262 million,

FIGURE 4.1
Investment Needs for Electricity, Transport, and Clean Cooking (US$ Million)



Source: GoSTP 2024.

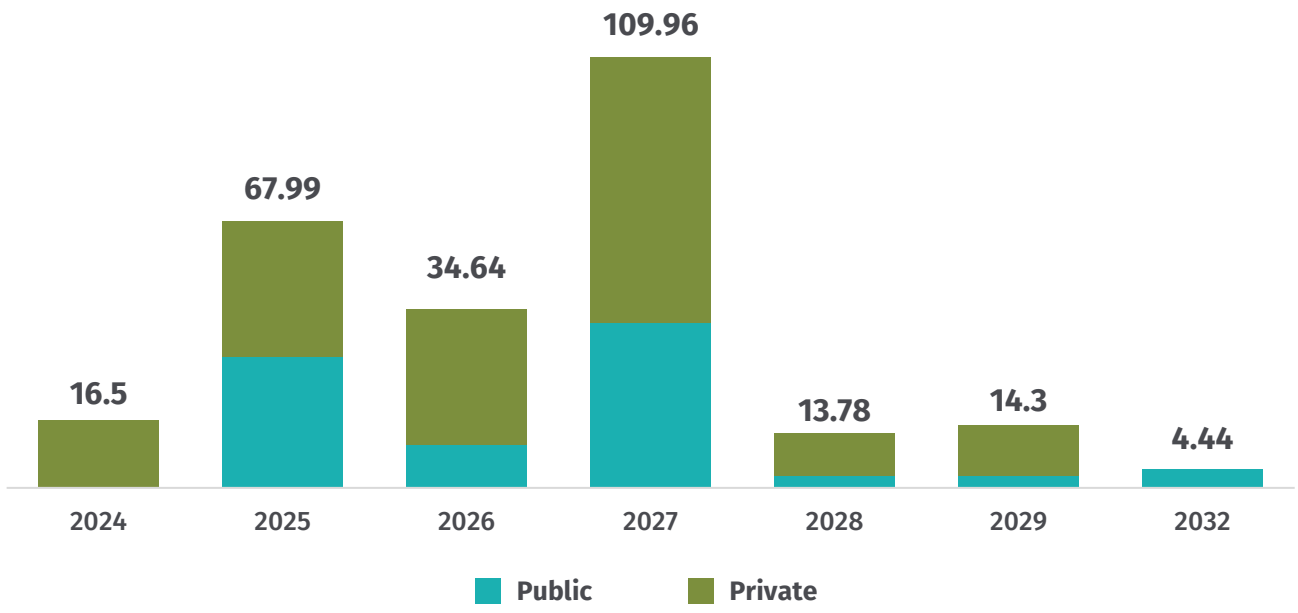


US$95 million in public investments is required to finance the costs of project preparation, preliminary engineering, land acquisition and compensation as needed, transaction advisory services, financial incentives, network investment, and capital expenditure contributions.

These investments will result in savings of over US$600 million over the next 8–10 years (nearly US$400 million in net present value). These savings largely stem from avoided diesel use only, without considering avoided loss of load and expected improvements in the quality of service. A large share of the public investments is for hydroelectric power development (table 4.1). Investments for the preparation of hydroelectric power projects will need to be prioritized to account for the long lead times.

FIGURE 4.2

Additional Financing Needs for the Electricity Sector (US$ Million)



Source: GoSTP 2024.

TABLE 4.1

Cost Estimates for Projects in the Electricity Sector

PROJECT	CAPACITY (MW OR KM)	INVESTMENT COST (US$ THOUSAND)	COMMITTED PUBLIC FINANCING (US$ THOUSAND)	OUTSTANDING PUBLIC FINANCING (US$ THOUSAND)	TOTAL PRIVATE CONTRIBUTION (US$ THOUSAND)
Scatec lease	11	16.5	-	-	16.5
Agua Casada Solar IPP	15	13.5	8.0	0.8	4.7
Battery storage	18	36.5	2.0	8.4	26.0
Rehabilitation of Guegue	0.32	1.8	-	0.8	1.0
Rehabilitation of Agostinho Neto	0.32	1.8	-	0.8	1.0
Biomass	0.5	1.0	-	-	1.0
lo Grande I	6.87	47.6	-	9.5	38.1
lo Grande II	2.61	13.8	-	2.8	11.0
Mumbai I	1.83	8.3	-	1.7	6.6
Mumbai II	1.17	6.1	-	1.2	4.8
Claudino Faro	1.81	17.5	-	3.5	14.0
Gas Plant	13	34.8	-	7.0	27.8
Contador Rehab	3.2	15.0	15.0		-
Expansion of HPP Contador		15.0	-	15.0	-
São Tomé Rooftop Solar	2	2.6	-	0.8	1.8
São Tomé Energy Efficiency	3.5	1.8	-	1.8	-
Solar Príncipe	7	11.1	-	3.3	7.7
Battery Príncipe	4	6.7	-	2.0	4.7
Príncipe Energy efficiency	0.5	0.3	-	0.1	0.2
Rehabilitación Papagaio 1	1.1	5.5	1.0	4.5	-
Subtotal (Generation)	**93.7**	**257.2**	**26.0**	**64**	**166.9**
30 kV network expansion	19.1	7.6	-	7.6	-
63 kV network	24.0	23.2	-	23.2	-
Subtotal (Network)	**43.1**	**30.8**	**0.0**	**30.8**	**0.0**
TOTAL	**136.8**	**288**	**26.0**	**94.8**	**166.9**

Source: GoSTP 2024.
Note: HPP = hydroelectric power plant; IPP = independent power producer; kV = kilovolt.

Financing Clean Mobility

Total estimated costs for cleaner mobility to support the energy transition over the next 10 years is approximately US$98 million, of which government contribution is approximately US$28 million and includes running costs for road maintenance and incentives. Near-term financing needs are relatively low as proposed actions are more focused on policy development and do not include much-needed road construction projects. In the near term, the establishment of a vehicle inspection center will be prioritized at an estimated cost of US$3 million. This center would ensure that vehicles comply with emissions and safety regulations, promoting the use of cleaner and more efficient fuel technologies. The estimate covers investment in infrastructure, specialized equipment, and staff training.

A crucial funding need for transport decarbonization is ensuring the maintenance of roads and securing consistent funding for this effort. The estimated annual cost for this initiative is projected to be around US$1.3 million. The National Road Fund is responsible for the management of resources allocated for government road maintenance.

For electric mobility (e-mobility) adoption in STP, the financing interventions, as outlined in the National e-Mobility Roadmap, estimate a total investment requirement of approximately US$257 million over 25 years. This investment is directed toward a variety of initiatives aimed at fostering e-mobility with a special focus in taxis and vans, as well as private vehicles. These initiatives include capital subsidies for EV purchases and infrastructure installations, as well as adjustments in tax collection from EVs and internal combustion engine vehicles.

Financing Clean Cooking

Reaching the clean cooking targets outlined in the 2024 PNACLM (50 percent of ≤ Tier 2 with firewood and charcoal and 50 percent of ≤Tier 4 with LPG and electricity) by 2030 requires a total investment of approximately US$4.4 million per year. This includes a public investment need of US$1.1 million per year to make clean cooking solutions affordable to poor and vulnerable households, unlock private sector involvement, and support the clean cooking market. Public investment does not cover the entirety of clean fuel subsidies that will need to be completed by other sources such as forest taxation and project finance. Private sector contributions are estimated at US$176,000 for the installation of downstream infrastructure for the functioning of modern energy cooking markets and the remaining US$3.2 million by households. Public sector investment represents 24 percent of the total investment needs, while private contributions represent 4 percent.

Drawing on Internal and External Sources of Funding

Given a total financing need of about US$390 million, or about 70 percent of STP's GDP for 2022, there are several sources that will need to be used jointly and complementarily to achieve full decarbonization. This includes reducing financial losses by improving sector performance, better managing sector revenue, increasing sector revenue, raising climate finance, and counting on the support of traditional and nontraditional partners.

Government contribution to the generation expansion program is estimated at US$64 million. Addressing the weak performance of the electricity sector is a

prerequisite for the transition by reducing financial losses and guaranteeing payments for investors. To boost revenue, the collection rate must improve, tariffs need to reflect actual costs, and technical and commercial losses should be reduced. The measures to reduce losses and enhance EMAE's operational performance will naturally increase revenue.

The current financial situation does not allow for subsidizing consumers who can afford to pay full tariffs, which are necessary for covering EMAE's operating costs. The General Regulatory Authority has implemented tariff regulations under Decree-Law 28/2021, which includes: setting the initial allowed revenue requirement (ARR) for EMAE over a five-year price control period, establishing procedures for periodic ARR adjustments, and defining consumption blocks and rates for each tariff category.

Tariff rates will be adjusted over time to eliminate subsidies for wealthier consumers, ensuring that demand- and energy-related costs are recovered across all categories except social. This will enable greater distributed generation (for example, solar PV) for larger customers without undermining EMAE's financial stability. A well-structured tariff has been approved to allow the utility to recover capacity-related costs from medium and large consumers, making the financial impact of changes in energy consumption neutral. This tariff methodology will be applied.

For transport, public funding is primarily directed toward infrastructure development, such as the vehicle inspection center and the capital subsidies for the installation of public charging stations (mainly for taxis, vans, electric motorcycles, and electric light vehicles). According to PANEE, the installation of 5,000 recharge points and the replacement of 1,000 inefficient gasoline or diesel taxis with more efficient vehicles by 2041–2050 is required. In other developing countries such as India and Rwanda, the government covers 50 percent of the cost of direct current chargers and 25 percent for alternating current chargers, which would phase out by 2035.

The Pivotal Role of Development Partners

Bilateral and multilateral support for STP's ambitious climate agenda are strong, with both financial and nonfinancial assistance committed through a number of programs. A key part of the program is to build confidence for private sector investors, and the participation of STP's development partners is key to reinforcing the government's commitment to the agenda.

The program aims to attract investors by increasing confidence, mitigating risks, lowering capital costs, and enhancing project competitiveness. Financing will combine concessional loans, grants, and risk-sharing mechanisms (such as guarantees and insurance) with viability gap funding. These resources will come from climate funds and both traditional and nontraditional development partners, including the World Bank, AfDB, the European Investment Bank, the European Union, the United Nations, and several embassies.

Institutions like IFC will be necessary for equity and mezzanine financing. Outreach will also target nontraditional partners, including climate finance providers and philanthropic sources.

The implementation of ongoing projects financed by development partners has been slow and below expectations. The government has taken steps to improve its performance in project implementation. An energy crisis committee has been established

under the Office of the Prime Minister to oversee key contracts under the projects. The Fiduciary Agency for Project Administration has been restructured to streamline project management in a cost-effective manner. As needed, international individual consultants have been recruited to provide technical leadership and training on various aspects of project implementation. The government will continue to review implementation arrangements to change the trajectory of project implementation progress. The use of private sector financing will address some infrastructure construction delays but introduces a new challenge of contract preparation and negotiations. This further highlights the need for technical assistance and strong collaboration with development partners.

Soliciting Climate Funds

While there is no single or "official" definition of climate finance, at the World Bank, it refers to funds provided by public or private entities to mitigate carbon emissions or support adaptation to climate change (World Bank 2022). In 2021/22, global climate finance reached nearly US$1.3 trillion, driven primarily by mitigation efforts in developed countries. Despite this growth, current levels are still insufficient to meet the goal of limiting global warming to 1.5°C, with estimates indicating a need for US$5–12 trillion annually until mid-century. Africa offers substantial opportunities for climate-related investments, particularly in agriculture and renewable energy.

Private investment comprises 50 percent of total climate finance globally; however, in Africa it is only 14 percent. Actual risk, perceived risk, and the small ticket size of transactions dissuade private developers and investors, but several derisking measures by public sector institutions and philanthropies could help expand private investment. Grant support from public and philanthropic sources could also support capacity building, both within domestic finance institutions and in helping to prepare a pipeline of investable opportunities.

STP will approach key players, including multilateral sources like the Green Climate Fund (which provided 71 percent of all multilateral climate funding[4] and has launched the second replenishment process), the Global Environment Facility (which received new donor pledges in 2023), and bilateral initiatives such as the U.S. Global Climate Change Initiative and Germany's International Climate Initiative.

Another option includes the Climate Investment Funds, established by the World Bank in partnership with major international financial institutions like the AfDB, the Asian Development Bank, the Inter-American Development Bank, and IFC. They include the Clean Technology Fund (CTF) and the Strategic Climate Fund.

Additionally, there are nontraditional sources such as philanthropic foundations and the carbon market that will also be explored.

4 Other potential multilateral climate funders include the Special Climate Change Fund, the LDC Fund, the Adaptation and the Loss and Damage Fund.

Private Sector Financing Outweighs Public Financing for Decarbonization

The government will develop policies to attract private capital, as outlined in this strategy, and work to mitigate some of the risks identified by private investors, including:

- **Country risks.** Uncertain political, economic, and security conditions could challenge long-term financing deals. These risks can be mitigated by including a standard protections clause (for example, political force majeure) in agreements and using appropriate risk mitigation tools like insurance and guarantees.
- **Off-take credit risk.** Without sovereign guarantees, state-owned off-takers may pose a risk of nonpayment, discouraging private investment. The risk can be mitigated by IFC, and the CTF's involvement will reduce this risk through innovative mitigation structures, encouraging commercial investment.
- **Market risk.** The small market size will not be attractive for many investors. To mitigate this risk, government will provide clarity on an investment portfolio to demonstrate some scale and combine projects to the extent possible. Market outreach will target boutique investors who can also offer tailored solutions relevant for the context of STP.

In the electricity sector, a revenue management account has been established to distribute customer payments among sector players (EMAE and IPPs) using a predetermined formula. This ensures regular cash flow for stakeholders and allows the government to monitor financial gaps. This interim measure will enhance revenue predictability until revenue meets or exceeds costs. The next step is to develop governance structures for the account and operationalize its management.

For transport, private sector investment will focus on vehicle procurement and charging infrastructure, especially in commercial areas like airports. To attract investment, the government plans to offer incentives such as tax exemptions and reduced customs duties. Public-private collaboration on land use and grid improvements will support the expansion of EV infrastructure. A strong regulatory framework and clear incentives (tax benefits, subsidies, and renewable energy concessions) will further encourage private sector involvement. Programs like vehicle scrapping and fuel grade diversification will open opportunities in fleet renewal and infrastructure upgrades.

For clean cooking, a predictable policy environment, including a 10-year fiscal plan, is essential to increase private sector confidence. The clean cooking unit will manage sector data, engage with development partners, and build capacity for project implementation. Results-based finance projects will provide technical assistance and support market development, including business services for suppliers and manufacturers domestically. This requires strong capacity building within the clean cooking unit.

V OUR REGULATORY FRAMEWORK TO DRIVE CHANGE

STP is committed to developing and enacting legal instruments that support its ambitious decarbonization agenda throughout the remainder of 2024 and into the following years. For example, in 2023, STP enacted Decree-Law 4/2023, which exempts customs duties on the import of solar PV panels, inverters, and other system components, which directly encourages both on-grid and off-grid renewable energy generation. Legislation has also been passed to increase import duty on inefficient lamps and eliminate duties and taxes for LPG imports.

Policies for Decarbonization in the Electricity Sector

STP aims to generate half of its electricity from renewable sources by 2030, corresponding to a 27 percent reduction in CO2 emissions. Several key policy actions are in place to support this transition, and others are in the process of being enacted. These include:

- **Tariff revision.** Applying the approved methodology to gradually adjust tariffs to better reflect the actual costs of generation and transmission, while targeting subsidies to ensure affordability.
- **Electricity sector legal code revision.** Updating Decree-Law 26/2014 (Electricity Sector Legal Regime) to attract private investment, with a focus on renewables, resulting in enhanced legal certainty, reduced risks, and allowing for the incorporation of new technologies and business models.
- **Self-production decree-law.** Establishing rules for individuals, companies, and communities to generate and consume their own renewable energy, with the option to export excess energy to the grid, aiming to diversify the energy matrix and reduce dependence on fossil fuels.
- **IPP regulation.** Outlining the legal and operational framework for IPPs; ensuring transparency and fairness in power purchase agreements and government support; specifying conditions for private sector participation, including both economic aspects such as investment protection, licensing, and compliance processes and financial incentives, as well as technical requirements for grid access and connection standards.
- **Technical standards and grid code.** Ensuring safe and reliable operation and expansion of both the LV and MV networks systems based on international experience.

- **Import regulation for lamps, refrigerators, and air conditioners.** Establishing energy efficiency standards to reduce consumption while ensuring functionality and affordability, in line with international best practices and regional initiatives.

Policies for Decarbonization in the Transport Sector

Regulation in the transport sector is deficient and INTT needs capacity and competency strengthening so that it can lead in the planning, coordination, and definition of standards. Some of these regulatory reforms include:

- **Technical standards and regulation for fossil fuel quality.** The standards will define requirements for fuel quality and be enforced through regulation that specifies legally binding minimum quality requirements for automotive fuels, including, for example, limits on sulfur, metallic emissions, hydrocarbons, and polycyclic aromatic hydrocarbons. This regulation may also set limits on the blending of certain types of biofuels that are not compatible with all engines; for example, it can establish the maximum volume percentages of ethanol in alcohol-blended fuels. This regulation will also establish methods for inspection and testing of fuels and labeling requirements for devices dispensing fuels.
- **Second-hand vehicle import regulations.** These regulations will establish control measures for the importation of used or second-hand vehicles and vehicle parts to ensure compliance with safety, health, environmental, and quality specifications. The regulations will also define the procedures to obtain import permits for used and second-hand vehicles and parts that observe the specified conditions.

Actions to Support Clean Cooking for All

The STP National Energy Policy opens doors to new initiatives and strategies to promote clean and modern cooking consistent with SDG 7, establishing in PANER and PANEE a target of 100 percent access to clean, safe, and modern cooking solutions by 2030. This is the first policy that explicitly addresses the transition to clean cooking and places the General Directorate of Natural Resources and Energy (DGRNE) of the MIRN as the hub for reforms that support the change. In particular, the strategy proposes the following three major pillars:

- **Promoting an enabling environment.** Strengthening DGRNE's role in overseeing the clean cooking sector, improving data collection and management, and supporting LPG fuel and appliance supply chains through the reallocation of kerosene subsidies
- **Enforcing the forestry code with penalties for noncompliance** Including the sustainable production of charcoal as part of the code and efficient mills that comply with relevant standards for charcoal production, as well as efforts to conserve and protect forests that face deforestation and erosion
- **Addressing the negative gender impacts of firewood on women and girls.** Including health risks and lost opportunities for education.

VI MEASURING MEANINGFUL IMPACT

The action plan will be monitored around its two pillars of policy and investment actions. A set of indicators have been developed to measure the outcomes of the action plan based on the results chain shown in figure 6.1. Past and ongoing tools such as the geographic information system–based mapping of the electricity network will be used in the monitoring approach adopted by the government. To enhance transparency in the assessment of impacts, evaluations will include regular engagement with local communities, civil society organizations, and other stakeholders. Results will be published online and there will be opportunity for reviews and disseminating lessons learned across different government ministries and agencies to inform policy design and implementation.

Reporting on Progress

Reporting will be carried out on an annual basis and the plan reviewed every 2.5 years.

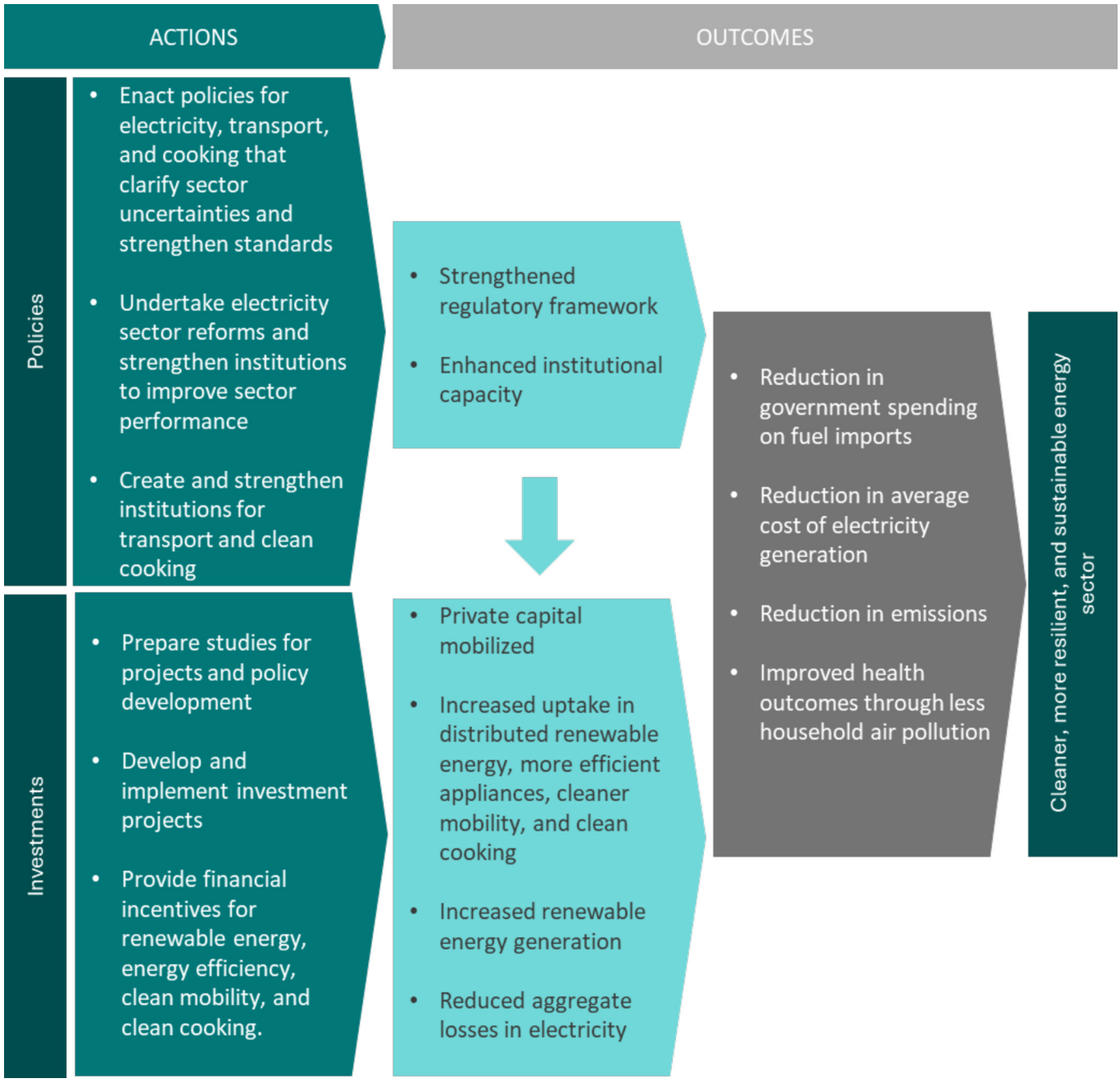
- **Regular annual progress reports.** Annual progress reports on the KPIs outlined in table 6.1 will be developed and made publicly accessible via the DGRNE website[5] on a newly created section dedicated to documentation. These reports aim to promote transparency, strengthen accountability, and foster collaboration with financial and technical partners.
- **Biannual evaluations.** In addition to annual reports, periodic evaluations will be conducted biannually to reassess strategies and actions as necessary. These evaluations will incorporate feedback from stakeholders and consider evolving conditions, ensuring that the approach remains aligned with overarching objectives.

Implementation progress will be monitored by the indicators listed in table 6.1.

5 See https://dgrne.org/en/home-dgrne.

FIGURE 6.1

Results Chain Toward Cleaner, Resilient, and Sustainable Energy



Source: GoSTP 2024.

TABLE 6.1

Cost Estimates for Projects in the Electricity Sector

	INDICATOR	TARGET	
		2030	2035
1	Number of regulations related to the transition that are passed by the government (in electricity, transport, and clean cooking)	8	10
2	Estimated reduction in emissions from electricity (compared with counterfactual)	65%	75%
3	Estimated reduction in emissions from clean cooking (compared with 2023 baseline)	40%	70%
4	Aggregate technical and commercial losses	20%	16%
5	Reduction in average cost of electricity generation (compared with 2023 baseline)	50%	70%
6	Reduction in government spending on fuel subsidies for nondomestic use (compared with counterfactual)	50%	70%
7	Total private capital mobilized for electricity, transport, and clean cooking (US$ million)	75	100
8	Share of renewable energy generation in electricity sector	50%	75%
9	Number of persons retrained and transitioned to new activities (compared with 2023 baseline)		
10	Share of persons retrained and transitioned to new activities (compared with 2023 baseline)	30%	50%
11	Reduction in disability-adjusted life years (DALYs) as a measure of improved health (compared with 2021 baseline)	15%	37%
12	Share of vehicles that are inspected for compliance with emissions and efficiency standards	40%	100%

Source: GoSTP 2024.

VII ENABLING FACTORS FOR A SUCCESFUL TRANSITION

High-Level Government Oversight

Commitment has been shown at the highest level of government toward the implementation of the action plan. Success relies heavily on the ability to raise funding, but strong leadership is required to set the right regulatory environment and implement projects at a satisfactory pace. An energy crisis committee has been established under the Office of the Prime Minister to monitor progress on all activities aimed at resolving the overdependence on diesel usage and its consequent challenges. Government oversight includes the following:

- **Energy policies.** Enacting clear and consistent energy policies to guide the development of the energy sector. This includes regulating electricity prices and setting incentives.
- **Regulation and enforcement.** Government oversight is necessary to ensure the compliance of regulations of the sectors.
- **Energy planning.** The government will conduct regular periodic reviews of generation expansion plans and base investment decisions on sound planning with the objective of maximizing value for money.
- **International cooperation.** The government will cooperate with international organizations and development partners for financing and technical assistance.

Effective Coordination Mechanisms

In addition to the crisis committee established under the Office of the Prime Minister, a multisectoral technical working group is being formed to serve as a platform for interministerial coordination on technical issues related to policy and project design as well as project implementation. The platform will be hosted under the MIRN and will comprise leaders from different sectors and ministries. This will facilitate collection of feedback and dissemination of lessons and results. The cross-cutting nature of the decarbonization transition further highlights to pivotal role of the working group.

Training and Reskilling

The energy transition will impact jobs, but there are more opportunities to grow new careers. Taking advantage of these opportunities requires skills development and, in some cases, reskilling. Current technically skilled EMAE staff offer an important source of labor to support the transition. In addition, there are opportunities for nontechnical jobs for which capacity building is required. A training plan based on a skill assessment has been published and partial funding obtained through the Access to Clean Resilient Electricity under the ASCENT (Accelerating Sustainable and Clean Energy Access Transformation) Regional Program – Multi-Programmatic Approach project (ASCENT STP – P177099) for implementation. This plan will be augmented to cover areas for reskilling. The training program will be gender-informed and women will form an important part of this training program.

Electricity. With the expected complexity of energy systems (from diesel generators to high solar penetration), technicians will need to develop skills in managing smart grids, which balance supply and demand, integrate renewable energy, and improve energy efficiency. There are various projects to expand the use of rooftop solar systems in public buildings as well as distribution of off-grid systems. This creates a significant need for trained and certified solar panel installers responsible for mounting them on rooftops, connecting electrical systems, and ensuring they meet local codes, as well as undertaking maintenance. As the solar market grows, customer support roles will increase, including helping with maintenance, system monitoring, and troubleshooting. This, combined with energy efficiency measures, creates the need for certified regulatory compliance officers to ensure conformity with legal and regulatory standards.

Clean cooking. Clean cooking offers several opportunities for small business ownership that will be explored to create jobs. Production of sustainable charcoal and biomass pellets (made from agricultural residues or wood waste) will be an emerging area for entrepreneurs, together with channels for the distribution of clean cookstoves and LPG supply. Women in particular can act as advocates and champions for clean cooking technologies in their communities, playing an essential role in building trust with other women and households through their shared experiences and concerns. As trusted figures, they can help educate others on the benefits of clean cooking for health, safety, and economic empowerment. Women's involvement in community-based outreach programs or social marketing campaigns increases the likelihood of widespread adoption. To this end, particular attention will be paid to women in the national training plan for the energy sector.

Transport. As transport policies reach the implementation phase, training and reskilling will be required in the areas of inspections, maintenance, and repair of electric and hybrid vehicles, electric charging infrastructure, and intelligent traffic management systems, among others. These will be the focus of training programs in the sector.

VIII THE ROADMAP FOR IMPLEMENTATION

PADRES is ambitious, with the objectives of transitioning away from diesel for power generation by 2030 from a current base of 96 percent, increasing access to clean cooking (Tier 3 and 4) to 50 percent from a base of under 10 percent and introducing age limits on vehicles. However, the scale of the challenge makes it surmountable.

Peak demand is estimated at only 21 MW. Only three other countries have lower installed capacity globally. Eighty-four percent of Saotomeans already have access to electricity, so universal access to electricity is within reach. Nearly 90 percent of the population owns a phone, a critical input for development today. There are only 60,000 households and less than 41,000 vehicles. While the small market size is a challenge, evidence from other SIDS have shown that a successful transition is possible. The priority is to develop the necessary policy base while raising funds for the plan of action. The critical actions are highlighted in the following roadmap in table 7.1.

TABLE 7.1

The Plan of Actions for the Decarbonization and Resilience of the Energy Sector (PADRES) Roadmap

ACTION	YEAR (ready by)
POLICY ACTIONS AND INSTITUTIONAL STRENGTHENING	
Electricity sector	
Pass regulation on embedded generation.	2024
Revise the Electricity Sector Legal Regime (Decree-Law 26/2014) to address private sector participation.	2025
Apply the approved tariff methodology to gradually adjust tariffs.	2025
Pass regulation on participation and access rights of independent power producers (IPPs).	2024
Publish technical standards and grid code for safe and reliable operation and expansion of both the low voltage (LV) and medium voltage (MV) networks.	2024
Pass import regulation for lamps, refrigerators, and air conditioners.	2025
Introduce private sector in the operations and/or commercial business of Empresa de Água e Eletricidade (EMAE).	2026
Operationalize escrow account to improve management of sector revenue.	2025
Transport	
Develop technical standards and regulations for fossil fuel quality.	2026
Pass second-hand vehicle import regulations.	2026
Develop demand-side measures that aim to encourage and enable users to buy and operate electric vehicles (EVs).	2026
Develop supply-side measures to support local market establishment; offset the use of fossil fuels; discourage polluting vehicles; and standardize the import, registration, and use of vehicles.	2026
Clean cooking	
Strengthen the General Directorate of Natural Resources and Energy's (DGRNE) role in overseeing the clean cooking sector through the setup of a dedicated team.	2025
Enforce the forestry code with penalties for noncompliance.	2026
INVESTIMENTOS	
Electricity	
Scatec lease: Letter of intent signed. Finalize power purchase agreement and project. Complete site preparation and interconnection lines under World Bank Accelerating Sustainable and Clean Energy Access Transformation (ASCENT) Program.	2025
Agua Casada Solar independent power producer (IPP): Feasibility and environmental and social impact assessment (ESIA) completed. Hiring transaction advisor. Launch competitive tender for 15MWp (megawatt peak) IPP.	2025

ACTION	YEAR (ready by)
Battery storage: Feasibility study completed. -> Complete engineering and launch tenders for procurement of first batch with public financing.	2025
Rehabilitation of Guegue and Agostinho Neto: Prefeasibility study completed. -> Secure financing and initiate feasibility and project preparation for implementation as IPP.	2026
Biomass: Scoping study completed. -> Secure financing for prefeasibility and feasibility study including fuel availability, secondary and primary usage, for implementation as IPP.	2026
Lo Grande and Bombain: Prefeasibility study and financing structure developed. -> Prepare detailed feasibility study, ESIA, and project preparation for implementation as IPP.	2026
Claudino Faro: Prefeasibility study completed. -> Secure financing for feasibility study and project preparation for implementation as IPP.	2026
Gas plant: Agreement reached with developer for generation capacity. -> Carry out study on gas options. Feasibility study or ESIA for gas facility. Tender for gas supplier.	2025
Contador expansion: Studies completed but no funding available. -> Raise funding	2024-2025
Rooftop solar program: -> Pass regulation to allow embedded generation. Raise financing for incentives (such as net-metering and feed-in tariff).	2024-2026
Energy efficiency: Light-emitting diode (LED) lamp rollout at 70 percent. -> Develop scheme and raise financing for incentives for appliance efficiency program.	2026
Príncipe Solar: Feasibility study underway. Financing being considered by AfDB. -> Launch tender for installation.	2025
30 kV network expansion: Funding secured with World Bank. Owner's engineer for implementation being selected. -> Tendering for works.	2025
63 kV network: No funding secured. -> Prepare feasibility and environmental and social studies.	2027
Papagaio hydropower plant: Feasibility study underway. Financing being considered by the African Development Bank (AfDB). -> Launch tender for installation.	2025
TRANSPORT	
Vehicle inspection center: Prepare studies and raise financing for construction of a vehicle inspection center.	2027
CLEAN COOKING	
Clean cooking incentives: Design scheme and raise financing for incentives for clean cooking.	2025–2027

Source: GoSTP 2024.
Note: -> = Upcoming activity.

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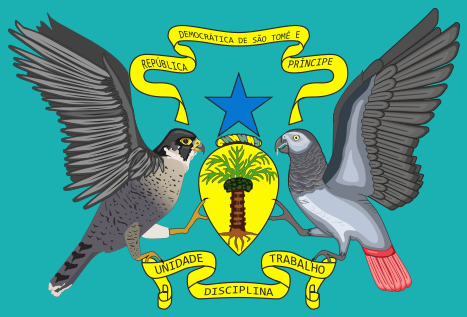
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