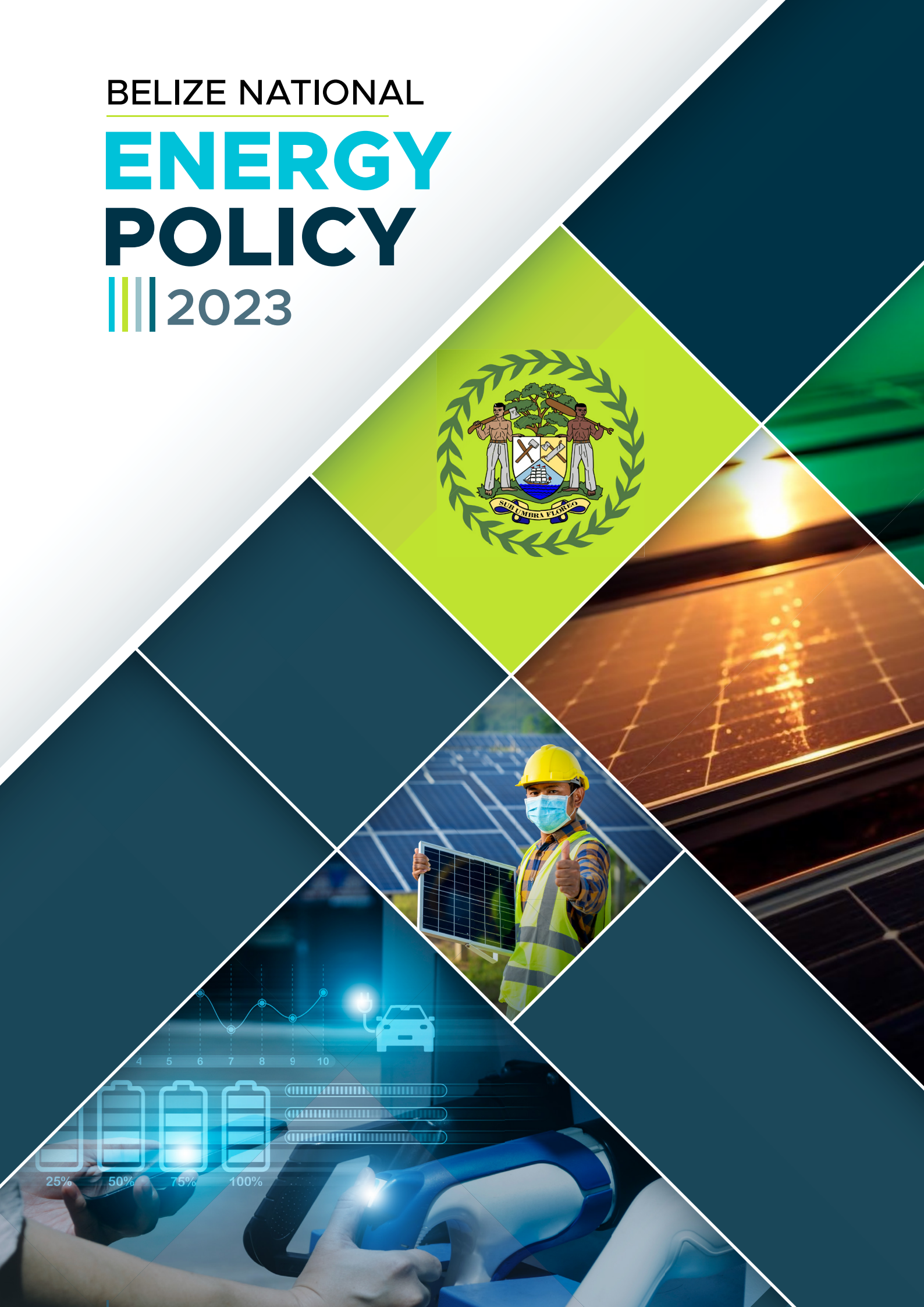
BELIZE NATIONAL

ENERGY POLICY

2023



BELIZE NATIONAL ENERGY POLICY 2023

Designed by: The Communications Unit of the Ministry of Public Utilities, Energy, Logistics, and E-Governance (MPUELE) with collaboration from the Energy Unit

November 2023

FOREWORD

In today's modern setting, energy markets and services are a critical input of the global economy and directly impact people's quality of life; therefore, I am both honored and excited to introduce the Updated National Energy Policy for Belize. As the Minister of Public Utilities, Energy, Logistics & E-Governance, it gives me great pride to present this transformative document that charts the way forward for our nation's energy landscape over the next two decades.

The global energy crisis being faced today is characterized by a complex interplay of socio-economic, geopolitical, and environmental factors, each contributing to the mounting challenges and uncertainties surrounding our energy future. Thus, our choices and actions in the energy sphere hold profound consequences for our environment, our economy, and the well-being of our people.

At the core of this policy is the Government of Belize's unwavering commitment on delivering a sustainable, secure, and affordable energy future for Belize. Belize, endowed with abundant natural resources and a vibrant spirit towards environmental stewardship, has already embarked on a journey towards sustainability as decarbonization takes center stage.

Nonetheless, now is the time to accelerate our efforts and transform the way we supply, transform, deliver and use energy services, leading to an energy future with co-benefits for development, human health, and climate change. By 2040, we envision Belize as a shining example of a low-carbon, energy-efficient, and environmentally responsible nation.

As a nation, meeting our ambitious climatic and energy targets is not a choice but a moral obligation to our planet and future generations. Climate change and our energy systems are deeply interconnected, and the need for us to act swiftly with comprehensive action has never been more urgent. Our mission, articulated through this policy, is clear: to steer our energy landscape towards sustainability, resilience, and prosperity. This policy is our pledge to enhance our resilience to a changing climate and seeks to ensure that the benefits of a sustainable energy transition are shared equitably among all Belizeans. It is a testament to our commitment to diversifying our energy sources, mitigating and adapting to climate change, bolstering our energy security, while embracing sustainable practices for a brighter future for all Belizeans.

We recognize the pressing challenges ahead and the notion that addressing them holistically is beyond the reach of our government alone. As we embark on this transformative pathway, we call for the active engagement of all sectors of society as partners in this endeavor. Our collective efforts can develop a Belize where clean energy is not a luxury but a fundamental right for every Belizean.

To everyone who has contributed to the formulation of this energy policy, I extend my heartfelt appreciation. Having reached this significant milestone, we are taking concrete steps towards a prosperous, sustainable, and resilient energy landscape for all Belizeans.

HON. MICHEL CHEBAT, SC.

MINISTER OF PUBLIC UTILITIES, ENERGY, LOGISTICS & E-GOVERNANCE

ACRONYMS AND DEFINITIONS

ASYCUDA	AUTOMATED SYSTEM FOR CUSTOMS DATA
BAPCOL	BLAIR ATHOL POWER COMPANY LIMITED
BAU	BUSINESS AS USUAL
IBBS	BELIZE BUREAU OF STANDARDS
BECOL	BELIZE ELECTRIC COMPANY LIMITED
BEL	BELIZE ELECTRICITY LIMITED
BELCOGEN	BELIZE COGENERATION ENERGY LIMITED
CARICOM	CARIBBEAN COMMUNITY
CCREEE	CARIBBEAN CENTRE FOR RENEWABLE ENERGY AND ENERGY EFFICIENCY
CFE	COMISIÓN FEDERAL DE ELECTRICIDAD OR FEDERAL ELECTRICITY COMMISSION
CHP	COMBINED HEAT AND POWER
CO_2	CARBON DIOXIDE
DER	DISTRIBUTED ENERGY RESOURCES
DEP	DOMESTIC ENERGY PRODUCTION
DG	DISTRIBUTED GENERATION
EE	ENERGY EFFICIENCY
ECE	ENERGY CONSERVATION AND EFFICIENCY
EM	ENERGY MANAGEMENT
EPC	ENGINEERING, PROCUREMENT, AND CONSTRUCTION
EV	ELECTRIC VEHICLE
GDP	GROSS DOMESTIC PRODUCT
GHG	GREENHOUSE GAS
IEA	INTERNATIONAL ENERGY AGENCY
IPP	INDEPENDENT POWER PRODUCER
IERP	INTEGRATED ENERGY RESOURCE PLAN
IRP	INTEGRATED RESOURCE PLAN (FOR ELECTRICITY ONLY)
IRRP	INTEGRATED RESOURCE AND RESILIENCE PLAN (FOR ELECTRICITY) ONLY)
IUS	INTEGRATED UTILITY SERVICES
KW	KILOWATTS
KWH	KILOWATT HOURS
LNG	LIQUEFIED NATURAL GAS

LPG	LIQUEFIED PETROLEUM GAS
MEPS	MINIMUM ENERGY PERFORMANCE STANDARDS
MPUELE	MINISTRY OF PUBLIC UTILITIES ENERGY LOGISTICS AND
MW	MEGAWATTS
$MTCO2_E$	MEGATON OF CARBON DIOXIDE EMISSION
NDC	NATIONALLY DETERMINED COMMITMENTS
NEPF	NATIONAL ENERGY POLICY FRAMEWORK OF 2011
OLADE	ORGANIZACIÓN LATINOAMERICANA DE ENERGÍA OR LATIN AMERICAN ENERGY ORGANIZATION
PHEV	PLUG-IN HYBRID ELECTRIC VEHICLES
PUC	PUBLIC UTILITIES COMMISSION
PV	PHOTOVOLTAIC
RE	RENEWABLE ENERGY
RFPEG	REQUEST FOR PROPOSAL FOR ELECTRICITY GENERATIONCOMMISSION
SDG	SUSTAINABLE DEVELOPMENT GOALS
SSEL	SANTANDER SUGARS ELECTRICITY LIMITED
SSB	SOCIAL SECURITY BOARD
TJ	TERAJOULES
TOE	TON OF OIL EQUIVALENT
UNDC	UPDATE NATIONALLY DETERMINED COMMITMENTS
UNDP	UNITED NATIONS DEVELOPMENT PROGRAM
V&A	VULNERABILITY AND ADAPTATION
vRE	VARIABLE RENEWABLE ENERGY

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POLICY BRIEF – NATIONAL ENERGY

The information in this section may be treated as a standalone document outlining the Belize National Energy Policy 2023 – 2040. It is a compilation of the Government's Vision Statement and Policy Objectives for the Energy Sector, as well as the Policy Statements and detailed Policy Positions, which are expected to serve as a practical guide for all key stakeholders in the energy sector.

VISION STATEMENT

"To improve the country's ability to effectively manage the energy sector, stimulate social and economic development through the energy sector and other cross-cutting sectors, and improve the sector's contribution to achieving Belize's Updated Nationally Determined Contributions."

POLICY STATEMENTS	SPECIFIC POLICY POSITIONS
POLICY OBJECTIVE 1 - REDUCE COST OF ENERGY SERVICES	
Government recognizes that the energy sector plays a crucial role in stimulating social and economic development across all sectors	1. MPUELE is committed to reducing the cost of energy services by reducing energy intensity through collaboration amongst key ministries
POLICY OBJECTIVE 2 - INCREASE INDIGENOUS ENERGY SOURCES IN THE ENERGY	
Government recognizes that transitioning to indigenous energy resources, is the most critical step to reducing demand for foreign currency, developing new industries, and creating employment	1. Government is committed to the establishment of a mechanism for MPUELE to conduct research to determine project feasibility for all indigenous energy source in collaboration with recognized and respected research institutions. 2. Government is committed to the establishment of regulations for a fair and transparent procurement process for all new investments in the development of indigenous energy sources. 3. Government is committed to attract investments primarily through public-private investments to increase local production of energy from indigenous source and to reduce unit cost of these energy sources.
POLICY OBJECTIVE 3 - INCREASE ACCESS TO ENERGY SERVICES SUPPLY MIX	
Government is committed to universal basic energy services for all citizens and enterprises by 2030 to improve their quality of life and social development.	1. Government supports a comprehensive universal access program that utilizes the more viable grid-tie or microgrid solutions. 2. Government is committed to the creation of an enabling environment for citizens and enterprises to access clean and affordable energy services.

POLICY STATEMENTS	SPECIFIC POLICY POSITIONS
POLICY OBJECTIVE 4 - IMPROVE CONTRIBUTION TO THE UPDATED NATIONALLY DETERMINED CONTRIBUTION	
Government supports a collaborative, cross sectoral approach to ensure that key stakeholders remain committed to the updated nationally determined contribution.	1. Government is committed to the establishment of a multi-sectoral team to ensure that the energy sector meets its nationally determined contribution.
POLICY OBJECTIVE 5 - IMPROVING GOVERNANCE IN THE ENERGY SECTOR	
Government is committed improve governance of the energy sector	1. Government is committed to the creation of a government department, established in law, as the central governing body.
POLICY OBJECTIVE 6 - STRENGTHEN ENERGY MANAGEMENT CAPABILITIES	
Government is committed to strengthening MPUELE energy management capabilities to improve its delivery of the energy agenda	1. Government is committed to the establishment, in law, of an autonomous procurement agency with the responsibility to manage and administer the procurement of new or refurbished energy infrastructure or energy services. 2. Strengthening the legislative and operational ability of the PUC to regulate all public utility providers and energy service companies 3. Government is committed to the establishment of a national energy company, owned by government, to manage government's current and new investments in the energy sector.
POLICY OBJECTIVE 7 - INCREASE ACCESS TO ENERGY INFORMATION	
Government recognizes that to make crucial decisions for the energy sector, stakeholders require access to energy information.	1. MPUELE shall establish a national energy management system, as an integral part of an e-government data management and data sharing platform.

The detailed work which explains the development of the Energy Agenda, Energy Policy and Targets is in the attached National Energy Policy report.

EXECUTIVE SUMMARY

The Belize National Energy Policy 2023 – 2040 (NEP) document includes a brief overview of developments in the energy sector since a national energy agenda was first established in 2010, an explanation of the newly developed energy agenda, a listing of clearly articulated policy positions, and recommended actions strategically compiled in order to achieve the policy objectives outlined by the Ministry of Public Utilities, Energy, Logistics and E-Governance (MPUELE).

These energy policy objectives were developed by the ministry to achieve practical economic and climate related targets by 2030 that are expected to positively contribute to the country's medium-term development plans and the updated nationally determined contributions to climate change adaptation.

To attain the 2030 targets will require the collaborative effort of MPUELE and other ministries, namely, the ministries responsible for transport, economic development, agriculture, and finance. However, it is imperative that this collaboration also extends to the private sector, civil society, and the wider public. At a high level, the policy objective endorsed by MPUELE to guide the process is stated as follows:

To improve the country's ability to effectively manage the energy sector, so as to:

- **stimulate Social and Economic Development, and**
- **improve the energy sector's contribution to achieving Belize's updated Nationally Determined Contribution.**

The NEP brings together all the major decisions made by the government and other key stakeholders, including energy strategies, new regulations, new energy infrastructure investments and divestments, cross-cutting policy decisions, and plans in other key sectors that significantly impact energy consumption patterns. It also takes into consideration the effectiveness of these decisions and projects and how they will help shape the country's energy future. The NEP also looks at the available energy resources and proven technologies to optimize the utilization of these resources. The newly established energy agenda will culminate in the establishment of new management capabilities to facilitate effective investments in new renewable energy production capacity, energy-efficient equipment and appliances, a highly trained technical staff, and modern energy services, which will achieve the targets set in the NEP.

Financial resources were also considered, as successful implementation of the NEP hinges on the ability of the Government to source funds from private, public, multilateral, regional, bilateral, or national sources to accomplish the stated goals. The policy recommends a budget planning exercise to identify financing gaps, followed by mapping of development partners, prioritization, and engagement to source these resources. This planning exercise will consider both administrative and implementation costs related to the policy. At the same time, identification of development partners has already commenced, given the time sensitivity of some of the stated goals.

To develop the new policy positions or to justify renewed commitment to already instituted policies, the policy development approach developed by OLADE for the energy sector in the region was applied.[4]

These guidelines start with a heavy reliance on sectoral data collected by the Energy Unit, other government agencies and from the vast number of studies conducted during the review period of 2010 to 2021 as well as more recent studies conducted over the last two years. The guidelines were also validated and fine-tuned using a consultative approach with key stakeholders ranging from key government ministries and agencies, local public utility providers, international agencies, and the media.

[4] Oxilia V., and Blanco G., "Energy Policy – A Practical Guidebook," The Latin American Energy Organization (OLADE), 2016

Most energy-related reports are written in a language that is not quite familiar to the average stakeholder. These reports speak about energy in standard scientific units of measure: terajoules (TJ), kilowatts (kW), British thermal unit (btu), and tons of energy equivalent (toe). Similarly, when speaking about the impact of the energy sector on the environment, the scientific unit of measure to quantify greenhouse gas (GHG) emissions is, for example, a kilo ton of carbon dioxide equivalent (ktCO2e). However, to gain total engagement and support from decision-makers and other key stakeholders in the sector or other related sectors, it was deemed useful to also measure energy consumption, transformation, production, and acquisition in a language we all speak – the dollar ($); and the reduction of GHG in percent (%). Therefore, the energy flow calculations, from primary energy supply to end-user energy consumption, were expanded to include the financial requirements for these energy transactions. When making the arguments to justify the decisions and recommendations, to present this case in dollars makes a lot of sense. For instance, readers get to answer which of the following numbers resonates the most to them in the following statement. In 2021, consumers spent almost $925 million dollars on energy services amounting to 13,900 TJ of secondary energy resulting 0.8 MTCO2e of GHG emissions. Whilst, in 2010, consumers spent an estimated $740 million for 11,000 TJ of secondary energy resulting in 0.5 MTCO2e GHG emissions (Annex II). In summary, the total cost of energy increased by 25% and GHG emissions increased by 30% over the review period.

The NEP also made another fundamental shift in the dialogue about energy. This report avoids the normal tendency to use energy and electricity interchangeably. The NEP makes the case that all subsequent studies, plans, and forums on energy should consider other subsectors, such as transport, and monitor energy conservation, not only by the end-user but also during the transformations and production processes. This approach expands the focus of decision-makers to other valuable parts of the supply chain and measures the sector's effort to avoid wastage at all levels, not only by the end-user. It will also help to determine the optimum unit cost of energy produced from indigenous resources, hence improving the marketability and competitiveness of the resource and the country's ability to participate in regional energy trade instead of just being a net importer of energy.

The policy positions stated in this document are expected to contribute positively to the aforementioned policy objectives and, by extension, the national agenda. These policy positions were grouped strategically into specific policy objectives and clearly articulated how they are expected to contribute to the relevant objective. Successful implementation of these policies is expected to reduce the country's energy intensity by 25%, increase renewable energy penetration from 35% to 75%, thereby meeting the projected reduction in the updated nationally determined contributions and reducing the energy bill to 15%.[3] of GDP by 2030 (Annex III).

[3] The energy bill in 2021 is estimated to be 21% of GDP.

RATIONALE FOR THE NATIONAL ENERGY POLICY

INTRODUCTION

A national policy, more often referred to as a public policy, is as old as the history of human governance[4]. Governments have sought to shape and manage communities by establishing clear policy positions that generally express the goals, decisions, and actions to manage key political, economic, social, technological, and legal affairs of government institutions, sectors, countries, or regions. These policy positions, goals, and decisions make up the national agenda for a specific community or sector and are supported by a prescribed course of action for key actors in that community or sector. Successful implementation can be measured by how much the policy changes behaviour and ultimately achieves the intended outcomes.

Governments throughout the world continue to identify economic development as a cornerstone of their mandate to provide public services that directly benefit the poor. However, economic development requires increased access to commercial energy in developing countries[5], which in most cases involves significant domestic and foreign investment. In Belize, the total cost of energy services produced by the sector is slightly over 21% of the country's gross domestic product. Moreover, Belize's energy intensity, defined as the ratio of total primary energy supply to each US dollar of GDP, was estimated at 188 toe/USD of GDP in 2021 (Appendix II). In comparison, for developed countries in the G20, the average energy intensity is 110 toe/USD000s of their GDP, and this figure ranges from 60 to 234 toe/USD000s of GDP[6]. For developing countries in Latin America and the Caribbean excluding Belize, the energy intensity ranges from 36 to 136 toe/USD000s of the country's GDP. Furthermore, recent studies have shown that as Belizeans seek a better quality of life, they tend to consume more energy for transportation, cooling, and entertainment as their earning power, proxied by the country's GDP per capita, increases.

Belizeans are using an inordinately high portion of their earnings to meet their energy needs unless the government and major stakeholders develop public policies, regulations, and plans to reverse this trend. Government's first comprehensive effort to address this challenge was in 2011, with the development and launch of the National Energy Policy Framework 2011, captioned: "Energy by the People .... For the People."

4 Katznelson I., "International Encyclopedia of the Social & Behavioral Sciences," Elsevier, 2001. [Online]. Available: https://www.sciencedirect.com/science/article/abs/pii/B0080430767045113

5 Swisher J. N., Jannuzzi G. M., and Redlinger R. Y. "Tools & Methods for Integrated Resource Planning: Improving Energy Efficiency and Protecting the Environment," 1997

6 OECD, Organisation for Economic Co-operation and Development. "Energy Intensity by Country," [Online]. Available: https://stats.oecd.org/sdmx-json/data/DP_LIVE/.PRYENRGSUPPLY.../OECD?contentType=csv&detail=code&separator=comma&csv-lang=en [Accessed 2023]

The government committed to the judicious exploration and utilization of the country's sustainable energy resources to serve their economic and social needs for the foreseeable future as cost-efficiently as is practicable whilst simultaneously mitigating the ravages of the volatility in supply and pricing and the environmentally damaging effects associated with fossil fuel use. The objectives of this initial policy were only implemented to a small degree and many of the overarching goals remain in place. The new energy policy sets out the agenda, action plan, and areas in which funding will be required to accomplish the economic growth and environmental targets over the short, medium, and long-term horizons.

CONTEXT OF THE POLICY - NATIONAL AGENDA

With the development and rollout of the Belize Medium Term Development Strategy 2022 - 2026, the Ministry is seeking to greatly impact the government's effort to meet these development goals. Consequently, the Ministry updated its energy policy objectives from the 2011 iteration and finalized this version of the National Energy Policy. To do this work, the Ministry of Energy was mindful that a good public policy must be goal-oriented, properly assess the current national, regional, and international realities, clearly define the specific expected outcomes of the government's action, and must address concerns of the general society, regulators, investors, regional, and international partners. This energy policy also "consists of government guidelines aimed to meet the needs of society."[7]

To give context to this exercise, it was determined that Belize's national energy agenda is derived from the goals outlined in Belize Updated Nationally Determined Contribution 2021, United Nations Sustainable Development Goals, and Belize Medium-Term Development Strategy 2022 – 2026. The Government of Belize's commitment to the international community is specifically outlined in the first two documents and is cemented in the government's commitment to its people in the latter of these three documents. **The consistent thread that brings all three documents together is the country's vision for:**

- **Economic Transformation**
- **Trade Deficit Reduction, and**
- **Protection of the Environment**

To guide the future development of the energy sector, the policy is being developed through a collaborative effort gained primarily through a series of stakeholder sessions with other ministerial bodies, civil society, the private sector, and the public at large. From these sessions and through the teams' participation in forums hosted by other ministerial bodies and international development agencies, policy recommendations took into consideration local, regional, and international development goals with the sentiments and views of the policymakers in the other ministries and agencies.

[7] Oxilia V., and Blanco G., "Energy Policy – A Practical Guidebook," The Latin American Energy Organization (OLADE), 2016

SCOPE OF THE POLICY

Whilst the National Energy Policy is expected to directly address and articulate the Ministry's position and expectations for Primary Energy Supply, Energy Transformation, and Transportation, it will require a more integrated approach to incorporate demand-side factors as developments in the energy sector influence all facets of society. National policy and guidelines on energy demand will require a significant level of input and participation from key sectors and related ministries that govern transport, economic development, infrastructure, tourism, environment, and rural transformation. Therefore, the demand-side policy shall be complemented by policy recommendations for these key sectors. In its implementation, MPUELE shall be required to work closely with key ministries – especially the Ministry of Transport - to further develop policies and guidelines that will govern how energy is utilized in these sectors. In summary, the policies governing energy supply shall be more sectoral in nature, whilst the policies governing energy use and demand must be more "cross-cutting."

To meet the policy objectives, strategies that address governance structures and laws, plus those that address institutional, human, and financial capacity, are all seen as foundational and must be implemented first. In terms of the latter, there must be a resource mobilization exercise carried out to identify the existing financing gaps for operationalizing the NEP, followed by a mapping exercise of development partners to identify potential financiers, which will ultimately lead to the engagement of these development partners by representatives from the Ministries involved (MOF, MPUELE) to meet said goals. Therefore, the time horizon for implementing these specific policies shall be, for the most part, short-term, with an expectation that these shall become operational within the first two years. However, the implementation of some of the cross-cutting policies shall extend further into the medium-term horizon. Similarly, policies that are expected to address access to energy services, especially for the poor and otherwise marginalized areas of society, are expected to be implemented over the short and medium-term. On the other hand, it is universally expected that policies that "seek to meet the structural needs of the socio-environmental system in order to boost economic growth and social progress" are usually long-term in nature[8]. However, due to the urgency to address the crippling impact the energy sector is having on the well-being of citizens, the government will be required to commit to ensuring that society can start benefiting from these policies in the medium term with the benefits extending into the long-term horizon. Simply put, the intent is to have some quick solutions, but not at the expense of future long-term development.

EXPECTED BENEFITS OF THE POLICY

In developing the policy, consideration was given to the expectation that successful implementation is dependent on buy-in from key stakeholders in the sector, and from others outside of the sector that impact its performance or are impacted by energy developments. A critical factor to ensure buy-in is an appreciation of the intended benefits of the policy document and any subsequent communication to these key stakeholders.

[8] Oxilia V., and Blanco G., "Energy Policy – A Practical Guidebook," The Latin American Energy Organization (OLADE), 2016

The expectation is that:

I. Government Departments and Agencies will be guided by these policies in the development and implementation of their strategies and plans.

II. Regulators will be guided by the policies in the establishment of regulations, evaluation of service providers, and in their decisions and rulings.

III. International Development Agencies will be able to direct funding and technical assistance based on the priorities established in the policies.

IV. The policies and recommended actions will increase investor confidence as they help to de-risk projects and offerings developed by investors and entrepreneurs for the sector.

V. Professionals in the sector will be guided by these policies and information provided.

VI. Educational institutions will be able to develop curricula to better prepare students for work in the sector based on the policy.

VII. General Public (End-Users) will be better informed on matters affecting their usage of energy and will seek to benefit from the improvements in the sector.

VIII. The policies and recommended actions will increase the confidence of local and foreign financial institutions and reduce the cost of financing investments in the sector.

IX. The policy will lead to significant investments in indigenous energy sources, energy-saving technologies, and alternative fuels to accomplish UNDC and SDG targets.

X. The policy will lead to increased employment opportunities, elevated income levels, and an expansion in economic growth in Belize.

XI. The economic growth and environmental targets over the short, medium, and long-term horizons.

OVERVIEW - ENERGY SECTOR & ENERGY SUPPLY MIX

In developing the energy policy, a comprehensive sector review was conducted to give context to the recommendations presented in this document. The review looked closely at developments in the sector and lessons learnt since the first energy policy of 2011 was endorsed and implemented. From this review, the following opportunities for improvement in the sector were identified, and policy positions were established to signal the government's commitment to improve the overall performance of the sector.

INSTITUTIONAL ARRANGEMENTS – ENERGY SECTOR

According to the information on the MPUELE website, "the Belize Energy Unit plans, promotes, and effectively manages the production, delivery, and use of energy through Energy Efficiency, Renewable Energy, and Cleaner Production interventions for the sustainable development of Belize." With a clear legal mandate and improvement to its structure, the Energy Unit will be in a better position to execute these functions. This perspective is supported in the Millennium Challenge Corporation's Electricity Concept Note 2022 and echoed in the Belize Sustainable Energy Action Plan of 2015.

In addition to strengthening the Energy Unit, access to energy data for decision-making is expected to improve with the establishment of a central repository for the data. In a recent report, it was noted that "several requests for socio-economic information were made to different dependencies and institutions of the Government of Belize, without favourable response."[9] This is typically the case when government departments, agencies within a ministry, or other stakeholders are seeking critical data. A less fragmented and more efficient coordination in the inputting, processing, and storage of energy-related data will ensure that major decisions will be made for the sector with relevant information and more reliable analysis.

THE ROLE OF PUC AS A REGULATORY BODY

The role of the PUC as a regulatory body is clearly established in the Electricity Act[10] and the PUC Act.[11] This was done in the absence of a clearly defined role for the Ministry with responsibility for electricity. Along with the PUC, operators in the sector have played a leading role as planners and custodians of market data and research for the sector. The willingness of the regulator and operators to participate in the planning, legislative,

[9] Government of Belize, Economic Development Council. "Comprehensive National Transportation Master Plan - 2018," 2019. [Online]. Available: https://edc.gov.bz/governmentpolicies/projects/cntmp/ [Accessed 2023].

[10] Belize, National Assembly. "Belize Electricity Act Chapter 227 Revised Edition, 2011"

[11] Belize, National Assembly. "Public Utilities Commission Act, Chapter 223, Revised Edition 2020," 2020

and procurement processes provides a major opportunity for a collaborative approach to the execution of these critical activities under the leadership of a restructured Energy Unit. These improvements would require legislative amendments, an expansion in the human resources and technical capabilities of the current Energy Unit, hardware and software resources, and financing to complete these activities.

TRANSPORT SECTOR

Like most countries in the region, the transport sector has not changed in structure over the review period, and neither has there been any structural change in the primary energy source – petroleum – or the downstream oil market responsible for the supply of this resource. Additionally, the sector is solely dependent on the import market for the provision of petroleum products at prices that are determined by international pressures and remain volatile. Furthermore, whilst the electricity market has been regulated since 2000, the transport market remains mostly unregulated, except for the market price and product quality. These two regulations are managed by the Ministry of Finance under the Supplies Control Act and Supplies Control (Prices) Regulations, and the Bureau of Standards under the Belize Standards Act with limited input from the ministry responsible for energy. The NEP highlights the government's commitment to close this gap by putting in place regulations and establishing an entity within the Ministry of Transport to provide oversight of fuel standards and equipment performance standards. Resources within the Energy Unit will be assigned specific responsibilities and equipped to oversee the planning and management of energy resources and the energy consumed in this sector.

COMMERCIAL & RESIDENTIAL SECTORS

The NEP is expected to address high energy bills (electricity and fuel) and price volatility, both resulting from the high imported content of our energy usage and its susceptibility to global shocks and price fluctuations. These have been identified as constraints to the growth of businesses, especially those with high energy reliance, which also impacts investor confidence as these firms complain of low profit margins. Several studies and surveys have revealed that local businesses, ministries, and professional associations strongly believe that the cost of electricity and fuel impedes business development in the country. However, only a few have appreciated that their consumption of energy has an even bigger impact on their energy bill than the electricity rate and fuel price.

TAPSEC's initiative to introduce an Integrated Utility Services Market Platform Model in Belize has yet to yield its intended outcome. This initiative was intended to promote viable energy efficiency (EE) business ventures to reduce energy costs and increase business profitability – primarily in the tourism and business process outsourcing (BPO) sectors.

The financial benefits derived in these sectors were expected to be transferrable to the other commercial industries and the residential sector once the EE adaptations were applied. In addition to the opportunity to introduce a viable business model to effectively deliver EE services, the introduction of standards and codes to guide and promote responsible use of this already expensive resource is also seen as key to reducing energy use in the commercial and residential sectors. Once the standards are in place, the move to EE represents an opportunity for the business sector to capitalize on the demand for energy-efficient goods and services by creating a market for those goods. Furthermore, the end-users will also realize savings on their bills from the lowered energy usage, reducing Belize's exposure to the international markets.

INDUSTRIAL & AGRICULTURE SECTORS

The industrial and agriculture sectors, like the transport sector, can benefit from effective regulations to improve energy use. These sectors can improve their gross profits if energy prices are reduced or if energy demand is lessened through the adaptation of EE practices and the use of more efficient machinery and vehicles, among other measures. Additionally, further research and development to unleash these sectors' full potential in producing energy from agricultural and agro-processing waste can further improve the viability of these sectors and reduce the demand for fossil fuels. More specifically, considering the positive impact of cogeneration of bagasse on the energy sector, the economy, and the environment, the NEP is expected to support the investigation and promotion of the production of additional biofuels and the potential for waste-to-energy conversion of other agricultural and organic waste. These sectors would benefit from the business model utilized by biomass power producers like Belcogen and Santander, which offset electrical expenses through their own production and could gain revenues from selling the power back to the grid. Both components of the investment in the waste-to-energy conversion would positively impact firms' profits and could lead to business expansion, increased employment, and economic growth.

R & D IN THE ENERGY SECTOR

On-going research and development in the energy sector is a key element required to de-risk investments in the sector. Recent integrated resource planning studies for the electricity market and the updated NDC provided cost estimates for the technologies considered in the respective studies. Pre-feasibility studies were completed for solar and wind,[12] and the agronomical study of "wild cane" as a biofuel is being conducted by 5Cs. Feasibility studies for future projects are needed. Fast-tracking the completion of these feasibility studies is critical to avoid any further delay in the addition of these energy resources to the supply mix while at the same time preventing the pursuit of risky under-developed projects as a quick fix to meeting the country's energy demands.

[12] DNV-GL, Report. "Belize Renewable Energy Feasibility Study," United States Trade and Development Agency, 2020

These studies complete a required step for potential investors, which saves them not only time but also capital spending, which would otherwise be passed on to the general public in the tariff agreed upon in the power purchase agreement when the new energy resources are brought on stream. Government's investment in R&D, in collaboration with the private sector, could bring about significant yields in the indigenous energy sector.

INVESTMENTS IN THE ENERGY SECTOR

Recently, there have been limited additional financial investments in the energy sector in Belize, with the Santander cogeneration plant (2017) and the National Gas Company (2020) being a few of the latest additions to the energy mix. The current energy agenda will seek to increase the sector's productive capabilities, particularly in the renewable energy space, where the Ministry plans to encourage investments to meet the SDG and UNDC goals. Additional investments will be required in the electric vehicle market, the production of biofuels, and other alternative energy production, among other areas.

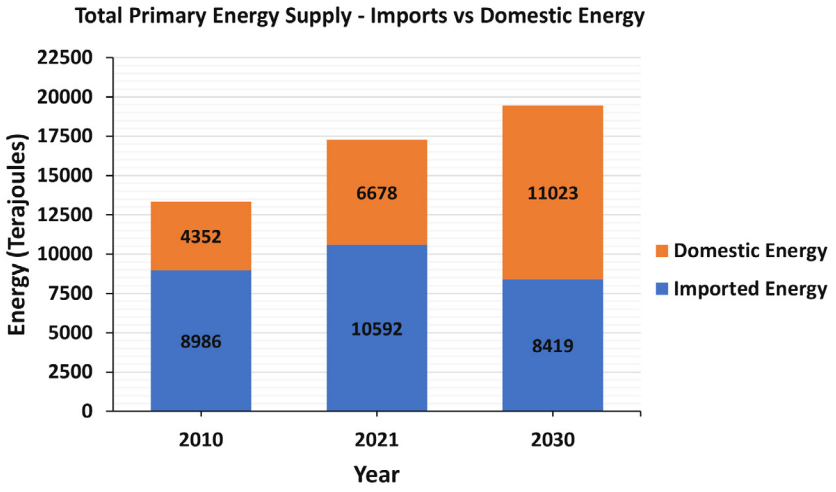
Considering the market size, investments in the electricity sector are typically dependent on power purchase agreements that guarantee the sale and rate of return on capital investments. Asset valuation is critical to the de-risking and financing of major projects in the electricity sector. The NEP is expected to continue to support this arrangement for investments in a more formal and structured manner for electricity generation, transmission, and distribution, as well as fuel production and distribution.

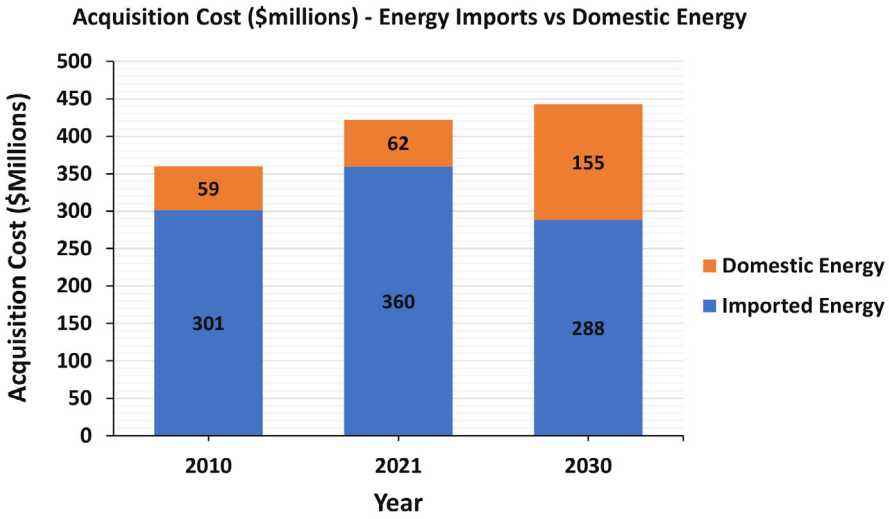
Government's position on investments in the energy sector that come to the end of their commercial term or project life is a critical factor in an investment evaluation. As Belize plans its energy transition, the disposal of stranded assets will be key to financiers' assessment of the investment climate. Therefore, planning for a smooth transition to more indigenous energy resources is imperative. To plan for this transition, the government will need to assess and address the potential for stranded assets so as to support current and new investors to better manage the investment risk. Currently, there is no institutional framework to effectively manage the government's estimated $400 million invested in the sector - including SSB (Annex VI).

All currency is in $BZD unless stated otherwise

2.7: ENERGY SUPPLY MIX

PRIMARY ENERGY SUPPLY – IMPORTED ENERGY VS DOMESTIC ENERGY





As shown in Annex II, Belizeans spent 21 cents out of every dollar earned on energy in 2021, the equivalent of $923.4mn. Moreover, 67% of the energy was imported, accounting for 85% ($360.2mn) of the total acquisition cost (Annex I). In 2010, Belizeans spent 20 cents out of every dollar earned on energy ($739.1mn), 67% of the energy was imported, accounting for 83% ($292.4mn) of the total acquisition cost.

The recommendations listed in Section 6 of the 2010 NEPF were only partially implemented and in a very limited way; as a consequence, not much has changed in the sector when it comes to the components of the energy mix. Significant financial expenditures are needed to reduce the country's reliance on energy imports, which will be a focus of the newly formed energy agenda.

2.7.1: FOSSIL FUELS

TRANSPORT (ROAD, MARINE AND AGRICULTURE)

Acquisition Cost - $ Million

		2030	2021	2010
Imp	Butane	$6.45	$5.86	$0.85
Imp	AvGas	$29.79	$29.79	$21.40
Dom	Ethanol	$17.36	$0.00	$0.00
Imp	Premium	$27.59	$30.65	$36.19
Imp	Regular	$77.76	$86.18	$52.56
Imp	Kerosene	$0.00	$14.00	$8.53
Imp	Diesel	$55.79	$61.99	$74.06
Dom	Bio-Diesel	$16.95	$0.00	$0.00
Dom	Crude	$0.29	$0.57	$3.95
	Dom	$35	$1	$4
	Imp	$197	$228	$194
	% of Imp.	68%	63%	66%

Market Value - $ Million

	2030	2021	2010	APPLICATION
Butane	$10.86	$9.87	$1.43	Freight
AvGas	$41.21	$41.21	$29.61	Aviation
Ethanol	$36.87	$0.00	$0.00	Private
Premium	$76.32	$84.40	$73.65	Private
Regular	$182.72	$202.45	$105.04	Private and Public
Kerosene	$0.00	$20.17	$11.48	Freight and Public
Diesel	$141.20	$148.53	$142.93	Freight and Public
Bio-Diesel	$44.79	$0.00	$0.00	Freight and Public
Crude	$1.87	$3.31	$2.97	Farming
Dom	$84	$3	$3	
Imp	$452	$507	$364	
% of TSES	46%	55%	49%	

In 2021, petroleum imports for use in the transport sector accounted for 63% of the total energy import bill and 55% of the total energy bill at just over $507mn. Imported fuels for cooking and other applications account for 31% of the total energy import bill (Annex II).

All currency is in $BZD unless stated otherwise

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Three integrated resource plans that outlined the future energy needs and how they would be met were completed within a four-year span, and of those only the first one was made available to the general public. Moreover, none looked at energy resource planning to address transportation fuels, even though it accounts for 54% of the total energy bill. Therefore, plans for an energy

2.7.2: ELECTRIC VEHICLES

From data downloaded from Belize's Automated System for Customs Data, ASYCUDA, in 2021, there were approximately 50 electric motorcycles, less than 20 electric cars, SUVs, and pick-ups, and fewer than 10 charging stations in Belize. The Ministry of Public Utilities, Energy, Logistics, and E-Governance, with support from the UNDP and the Ministry of Transport, launched an e-mobility pilot project for Belize "Towards Low Carbon Transport: Piloting e-mobility with Belize's Public Transport System.[13] " The government's goal is that this project will "accelerate the electrification of transport as part of a clean vision for Belize." The outcome of this pilot project will help to determine the scale of investment in electric vehicles and e-mobility services.

2.7.3: BIO-FUELS

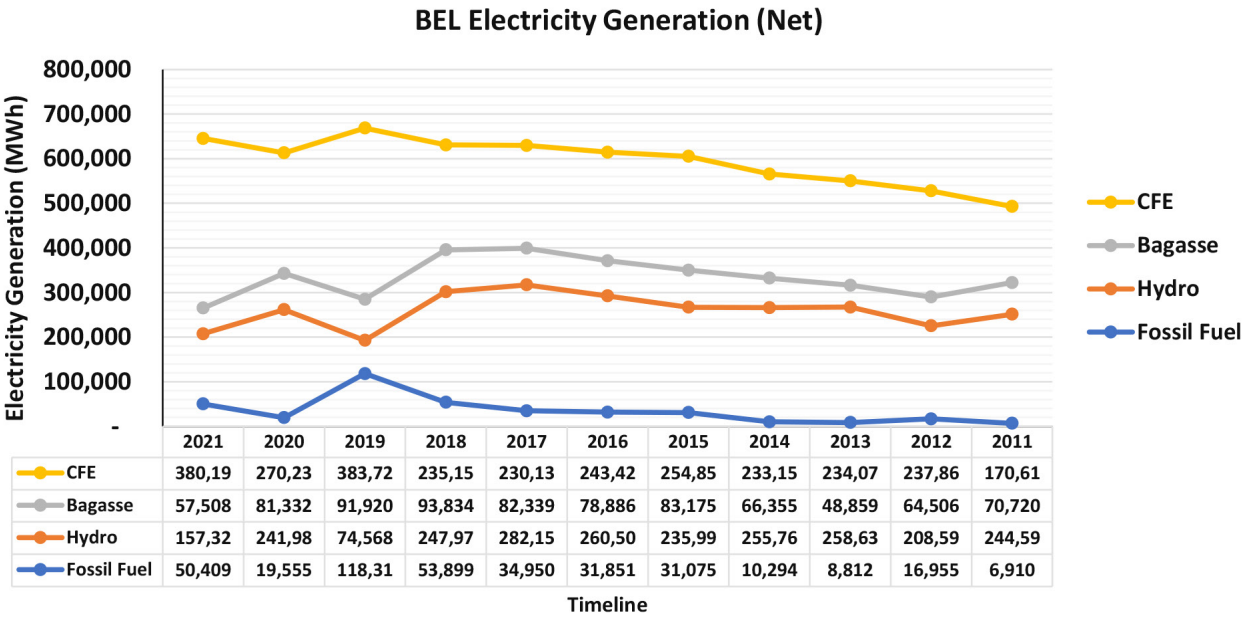
Currently, biofuels are not available in Belize. A policy consideration in Belize National Investment Policy Strategy[14] is to address the country's under-investment in biofuels. The introduction of E10 and even up to E30 gasoline (ethanol blended in gasoline) has been identified in the Belize Consolidated Project Plan Report[15] as viable without the need for retrofits of existing gasoline vehicles or the fuel distribution network.

[13] https://www.undp.org/belize/press-releases/ministries-energy-and-transport-belize-city-council-and-undp-launch-e-mobility-pilot-belize

[14] Government of Belize, Ministry of Economic Development. "National Investment Policy and Strategy," 2021

[15] Bunker, Kaitlyn, Roy Torbert, et al., "Belize Consolidated Project Plan. Rocky Mountain Institute," 2018, http://www.rmi.org/Belize-consolidated-project-plan

2.7.4: IMPORTED ELECTRICITY



	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
CFE	380,19	270,23	383,72	235,15	230,13	243,42	254,85	233,15	234,07	237,86	170,61
Bagasse	57,508	81,332	91,920	93,834	82,339	78,886	83,175	66,355	48,859	64,506	70,720
Hydro	157,32	241,98	74,568	247,97	282,15	260,50	235,99	255,76	258,63	208,59	244,59
Fossil Fuel	50,409	19,555	118,31	53,899	34,950	31,851	31,075	10,294	8,812	16,955	6,910

Since the 1990s, Belize has been importing electricity from Mexico to meet its growing demand and improve system stability and reliability of the grid. Over the review period, electricity imported from Mexico accounted for 43% of the total electricity supply (BEL Annual Report, 2021). In 2021, Mexican supply accounted for 47% of the total electricity supply, but only 31% of the total electricity cost of power. The cost of Mexican imports fluctuates with global petroleum prices and has varied between being the most expensive source of electricity and the least expensive over the period of review. In 2021, electricity imports totalled $56.6mn but were $99.4mn at the end of 2019, when the country's demand for external power was spurred by extremely low domestic production. These statistics highlight two of the three key concerns of the Mexican supply: its price volatility, foreign currency requirements, and the GHG emissions associated with its energy source. Investments in domestic production are aimed at reducing the demand for foreign currency, price volatility associated with electricity imports, and addressing the government's concern about energy security.

2.7.5: BIOMASS

The processing of electricity from bagasse has grown from 403.3 TJ in 2010 to 471.8 TJ in 2021, peaking in 2018 at approximately 700 TJ (Annex IV). Total output from this energy transformation is fully dependent on the availability of usable bagasse and the efficiency and reliability of the processing plants, as the offtake from these plants is guaranteed by "take or pay" power purchase agreements. Biomass plants in Belize exist primarily to produce low-pressure steam to run sugar mills; high-pressure steam is used to produce electricity for the plant, and the excess is sold to the national grid.

All currency is in $BZD unless stated otherwise

In the Energy Unit's 2021 Annual Energy Report[16], it was estimated that 2,943 TJ of low-pressure steam was produced in 2021, and in the NEPF, it was estimated that 639 TJ was produced in 2010. This operation has been a significant contributor to Belize's economy and renewable energy penetration, as it displaced expensive fossil fuels that were a drain on the country's foreign currency reserve.

2.7.6: SOLAR

Over the review period, the cost of solar panels has fallen from US$1200/kW to US$200/kW[17]. As a consequence, grid-scale solar has become a viable energy resource and is supported in all three integrated resource plans. These plans have advocated for significant investments in the technology, and the Government, through this policy, is supporting its development to become a critical electricity resource going forward. Belize ranks ninth in the Caribbean region in enabling environment for DG and on regulations on feed-in tariff [18]. Without legislation to establish feed-in tariff, access fee and grid connectivity standards, DG customers remain connected to the national grid while minimizing their contribution to its viability and without regulatory oversight. In addition to focusing on utility-scale solar, this policy will also encourage further increase in DG penetration by improving the regulatory environment. It is imperative that improvements in the regulatory environment also capitalize on the lessons learnt from the RMI report "Solar Under Storm"[19] that looked at best practices for resilient PV systems with hurricane exposure and use this information to develop design and construction standards for solar PV.

2.7.7: WIND

The installation cost of wind turbines has fallen by 40% from 2010 to US$1,500/kWh in 2021. Based on the reduction in installation cost, the average levelized cost of wind generation (LCOE) has fallen to US$0.032/kWh in 2021.[20] However, despite this price reduction and the introduction of the technology in the region over the review period, Belize has not yet adopted wind energy production. A USTDA study conducted in 2018 identified locations in Belize where this technology is deemed viable.[21]

[16] Belize, Energy Unit. "2021 Annual Energy Report," 2022

[17] IEA, International Energy Agency. "Evolution of solar PV module cost by data source, 1970-2020," IEA, Paris https://www.iea.org/data-and-statistics/charts/evolution-of-solar-pv-module-cost-by-data-source-1970-2020, IEA: CC by 4.0

[18] Earnhardt D., "Renewable Islands Index," Castalia, 15th Caribbean Renewable Energy Forum (CREF), 2023

[19] Burgess C., Goodman J. "Solar Under Storm," Rocky Mountain Institute, 2018

[20] Wiser R., Bolinger M., Millstein D. et. At. United States Department of Energy. "Land-based Wind Market Report: 2022 Edition," [Online]

[21] DNV-GL, Report. "Belize Renewable Energy Feasibility Study," United States Trade and Development Agency, 2020

2.7.8: WASTE-TO-ENERGY

In a report prepared by UNDP on "Analysis of the potential of utilizing the methane (CH4) emissions produced at the primary solid waste disposal sites from the Western Corridor (Belize and Western Districts) for electrical energy generation,"[22] the conclusion was that it is economically feasible to generate up to 4 MW of electricity and sell to BEL at a rate of US$0.10/kWh by collecting landfill gas released from the Mile 22 Regional Sanitary Landfill, especially if government can access carbon credits for the emission avoidance at this site. This study establishes the potential for waste-to-energy projects at sanitary landfills throughout the country. It also highlights the potential for waste-to-energy power generation and heat recovery using agricultural and other organic waste as presented in the **Pre-feasibility of Co-generation from Organic Waste in Belize.**

2.7.9: BATTERY

The use of battery for grid support and load shifting (grid optimization) was contemplated by the IRPs that were completed for Belize. Battery as a storage is globally used in the industry to support the addition of more intermittent and non-dispatchable energy supply on electrical grids, like run-of-the-river hydro, solar, and wind. Battery storage technology was selected for Belize in only one of the three IRPs, as essentially CFE is considered as the de facto battery or reserve power supply since it can instantaneously provide up to 55 MW of support.[23] However, over the planning horizon, battery as a storage can be pursued, once cheap, reliable, intermittent, and non-dispatchable generation is identified and secured.

2.7.10: ENERGY EFFICIENCY

During the review period, a few energy service companies have emerged to provide RE and EE services. These companies are listed on the Development Finance Corporation website as a part of a loan program offering 100% financing for RE/EE projects. Of the dozen companies listed, only two provide EE services. The demand for these services remains low despite the expected impact of these services on the client's energy bill.

[22] Lewis G., "Analysis of the potential of utilizing the methane (CH4) emissions produced at the primary solid waste disposal sites from the Western Corridor (Belize and Western Districts) for electrical energy generation," UNDP-Belize, Activity 5, 2008

[23] Bunker, Kaitlyn, Roy Torbert, et al., "Belize Consolidated Project Plan. Rocky Mountain Institute," 2018, http://www.rmi.org/Belize-consolidated-project-plan

Caribbean Centre for Renewable Energy & Energy Efficiency, "Belize IRRP Expansion Plan Report," Energy Unit, 2022

Siemens PTI, "Belize Electricity Limited – Integrated Resource Plan," Energy Unit, 2023

2.8: CRITICAL CROSS-SECTORAL ISSUES

2.8.1: TRANSPORT

The Transport Ministry shared its visions for "an effective and efficient transport system providing smooth operations for freight and passengers without requiring excessive resources; aiming for social equity by providing accessibility to all, especially to those who have less; sensitive to environmental preservation with a focus on mitigation and adaption to climate change; and enhancing Belize's growth by supporting development opportunities in all economic sectors."[24] However, from the situational analysis in this report, it was noted that Belize currently has a "deficient organization of bus transport sector, including inappropriate bus stop infrastructure; very old fleet: lack of data on bus passenger profiles; oversupply of small operators, lack of policy on permits issuing; and few formally constituted public transport companies."

As a result of these challenges in the transport sector, 35% of public transport users plan to buy a car in the near future and 43% will stop using public transport" compared to only "12% of car users indicate that they may shift from cars to public transport if public transport services are improved." The report went on to state that Belizeans who aspire for more efficient energy use, "the majority (around 43%) is planning to replace their vehicles with other more efficient vehicles and only 10% is considering the option of fuel switching.

[24] Government of Belize, Economic Development Council. "Comprehensive National Transportation Master Plan - 2018," 2019. [Online]. Available: https://edc.gov.bz/governmentpolicies/projects/cntmp/ [Accessed 2023]

The most impactful cost-saving and energy conservation actions in this sector would be the reduction of private transportation. However, this has not been adapted as a key strategy or plan for the transport sector. In an exercise to assess different energy scenarios for member states in The Caribbean Community (CARICOM), Belize listed transport as its least priority sector, (Regional Energy Efficiency Strategy, p. 2019).[25] With the establishment of the NEP, this decision is expected to be reversed, and significant attention will be given to these issues to encourage a shift from private to public transportation.

2.8.2: INFRASTRUCTURE

At the regional level, building design and its impact on EE and air quality was listed as a key area of focus in the energy sector for the region to meet its climate change and sustainable development goals. As a result, the region developed and published its energy efficient building codes in CARICOM Regional Energy Building Code.[26] Also, the Belize Energy Efficiency Handbook[27] was produced for the sector. However, these codes and guidelines must be written into law with reasonable phase-in periods for new construction and retrofits. Like most laws in Belize, there needs to be oversight and systems for accountable enforcement by the central and local building authorities.

[25] Hamlin T., Matte J. "CARICOM Regional Energy Efficiency Strategy," Technical Assistance Programme for Sustainable Energy in the Caribbean

[26] Caribbean Centre for Regional Energy & Energy Efficiency (CCREEE). "CARICOM Regional Energy Efficiency Building Code," 2018 (TAPSEC), 2019

[27] Government of Belize, Energy Unit. "Improving Energy Performance in Belize - A Continuous Learning Culture," 2017

2.8.3: TAX REVENUES

The Government's heavy reliance on tax revenues on imported fuels is a challenge that cannot go unnoticed. Taxes on fuels, except kerosene, range from %40 to %45 of the pump price for 2021 (see Annex VI), estimated to be about %20 of total expenditure on energy (approx. $190 million). On the other hand, taxation on the electricity sector was estimated at just under $24 million. As the country transitions to e-mobility and DG energy solutions, the challenge for any government will be how the Ministry of Finance plans to make up this projected $100 million to $200 million per annum shortfall if the government does not revise its present tax regulations. Ultimately, the government's ability to overcome this challenge will be a key determinant of the level of support that Cabinet gives to the National Energy Policy and corresponding Policy Positions.

> **Taxes on fuels, except kerosene, range from 40% to 45% of the pump price for 2021 (see Annex VI), estimated to be about 20% of total expenditure on energy (approx. $190 million).**

All currency is in $BZD unless stated otherwise

2.9: REGIONAL TRENDS

Belize is an active member of both the Central American Integration System (SICA) and the CARICOM. It is positioned to benefit and be impacted by energy developments in these regions. The most significant energy development in SICA has been the construction and operation of the Central American Electrical Interconnection System (SIEPAC), which interconnects the transmission grid of the Central American countries, except Belize, with Mexico in the north. Besides improving system stability, this system gives these member states access to relatively cheap electricity from Mexico, as well as an opportunity for cross-border trade. While Belize does not directly benefit from this arrangement, it has observer status to the agreement and can pursue the commercial benefits between the region and Mexico. Another significant development in the region, according to an IRENA presentation on SIEPAC, is that "RE accounts for 81.9% of installed capacity," with hydro "accounting for 30% of the installed capacity."[28] Belize can benefit from an in-depth evaluation of RE penetration by its neighbours.

Migration from Central American countries continues to drive Belize's population growth and its energy demand. Of the 33% increase in population from 2010 to 2021,[29] it is estimated that migration (documented and undocumented) accounts for anywhere from 30% to 45% of this increase. This phenomenon is expected to continue to impact Belize's population growth and increase its energy demand.

Within CARICOM, energy efficiency, replacement of fossil fuels for power generation, and e-mobility have been the regional priorities for the energy sector. The region's progress in these areas is expected to influence developments in Belize.

2.9.1: GLOBAL TRENDS

Global energy prices will continue to have a major impact on the decisions made by governments and other major stakeholders in the energy sector – especially transport that is totally dependent on fossil fuels and imported vehicles. The Economist Intelligence Unit shared the following outlook on different topics which are likely to impact the decisions made in Belize's energy sector: increasing frequency of droughts, heatwaves, and hurricanes forcing countries to fall back on fossil fuel; volatile economic and geopolitical environment will reduce the availability of climate finance; high interest rates will increase the cost of financing of renewable energy projects; and, Europe's decision to be less dependent on Russian gas will continue to change the pricing model for natural gas.[30] MPUELE will be required to pay keen attention to these global trends in the energy market as it leads the development of the first Integrated Energy Resource Planning exercise for Belize.

[28] IDB, Inter-American Development Bank. "Report on Central American Electricity Integration – Benefits and Outlook of the SIEPAC Project"

[29] Statistical Institute of Belize (SIB). "Population & Household" [Online]. Available: http://sib.org.bz/statistics/population/

[30] EIU, Economist Intelligent Unit, "Energy outlook 2023 – Surviving the energy crisis," 2022

3. SETTING THE ENERGY AGENDA

Beyond the development of a National Energy Policy, this exercise shall result in a clearly articulated energy agenda presented in a manner that can be referenced as Policy Guidelines for all ministries and government agencies. These institutions, as well as regional and international development agencies, will be expected to adapt this energy agenda as a part of their action plans. Similarly, investors, financial institutions, local and regional energy service providers, non-government organizations, and the general public are expected to align with the actions promoted in the national energy agenda.

3.1: POLICY OBJECTIVES

The National Energy Policy, like any other sector policy, must clearly contribute to Belize's national agenda, which is built on the country's Strategic Vision for Economic Transformation, Trade Deficit Reduction, and Protection of the Environment, among other main areas of focus. These three pillars were derived from the goals outlined in the Belize Updated Nationally Determined Contribution 2021[31], United Nations Sustainable Development Goals[32], and Belize Medium-Term Development Strategy 2022 – 2026.[33] However, the Ministry also recognizes that to contribute in an impactful way to Belize's national agenda, it must first improve its ability to guide and support the energy sector. With this backdrop, the energy agenda is outlined in the following strategic vision and policy objectives:

TO IMPROVE THE COUNTRY'S ABILITY TO EFFECTIVELY MANAGE THE ENERGY SECTOR, OVER THE NEXT TWO YEARS, MPUELE IS COMMITTED TO

- Improving Governance in the Energy Services Sector.
- Strengthen Energy Management Capabilities, and
- Improve Access to Energy Information.

TO STIMULATE SOCIAL AND ECONOMIC DEVELOPMENT THROUGH THE ENERGY SECTOR AND OTHER CROSS-CUTTING SECTORS, COMMENCING WITHIN THE NEXT THREE YEARS, BY

- Reducing Cost of Energy Services.
- Increase Renewable Energy Resources in Energy Supply Mix.

[31] Government of Belize, Ministry of Economic Development. "Belize Updated Nationally Determined
[32] Contribution 2021" United Nation Sustainable Development Goals https://www.un.org/sustainabledevelopment/
[33] Government of Belize, Ministry of Economic Development. "Belize Medium-Term Development Strategy 2022 – 2026" [Online], Available: https://med.gov.bz/wp-content/uploads/2023/04/Belize-Med-Term-Dev-Stategy-Action-Plan-2022-to-2025.pdf

TO IMPROVE THE ENERGY SECTOR'S CONTRIBUTION TO ACHIEVING BELIZE'S UPDATED NATIONALLY DETERMINED CONTRIBUTIONS BY

- Supporting a collaborative, cross-sectoral approach to ensure that key stakeholders remain committed to the updated nationally determined contribution.

3.2: EFFECTIVE MANAGEMENT OF THE SECTOR

There has been a twenty-year-old debate on the right management structure for the Energy Sector. However, the decisions made for this sector are so critical to a government's ability to meet its energy policy objectives and national agenda, that governments can no longer leave these decisions to "the market."

3.2.1: IMPROVING GOVERNANCE STRUCTURE IN THE ENERGY

It is imperative that Cabinet approves a governance structure that identifies and empowers **a central governing body**, established by law, to carry out the specific functions required for the successful realization of the policy objectives.

The key functions of the central governing body for the energy sector will include:

i. oversee the drafting of energy policy and related legislation.
ii. coordination of research.
iii. integrated energy resource planning, and contingency planning for the total energy sector[34]
iv. oversight of energy policy implementation.
v. data collection and reporting.
vi. oversight of planning and policy for the efficiency and economic dispatch of energy.
vii. liaison with the procurement agency for major energy infrastructure projects.
viii. coordination with cross-sectoral agencies or committees on energy.
ix. liaison with the regulatory body, regional and international energy agencies, and current and potential investors.

The governance structure should continue to recognize the need for an **autonomous regulatory body**, governed by law, to regulate the investments and services provided by public utility providers and licensed utility service providers, and set just and reasonable rates for the energy services they provide.

The governance structure should finally address the perennial area of contention between the key entities – responsibility for the procurement of major energy infrastructure. This lack of clarification of roles could be resolved with the establishment by law of **an autonomous procurement agency** responsible for managing and administering the procurement of new or refurbished energy infrastructure. The proposal is for Cabinet to appoint suitably qualified professionals with no relationship to entities affected by the decisions of this agency.

The Government of Belize has approximately $400 million directly invested in the energy sector and is the beneficiary of royalties from petroleum reserves. It is imperative that government establishes the purpose and goals of these investments and establishes **a national energy company**. This company should also oversee the government's investment in private-public partnerships in the sector. The Chairman of the Board should be appointed by the Minister of Finance, and directors appointed by both ministries, subject to the approval of Cabinet.

The government is also positioned by contract with public utility providers to take over useful energy assets at the date of maturity of these contracts.

[34] All previous integrated resource planning exercises were conducted for the electricity market only, instead of the entire energy sector.

The proposed energy company should be prepared long before the maturity date to effectively manage such a major responsibility.

3.2.2: STRENGTHENING ENERGY MANAGEMENT

The most significant form of empowerment of the central governing body for the energy sector is the establishment of this entity by an act of parliament. This will empower this body to function at the level of a **government department, the Department of Energy**. The Department of Energy will be led by a **Chief Energy Officer** with authority synonymous with the Chief Environmental Officer, Chief Education Officer, or Chief Forestry Officer. Such an individual will be supported by **Programme Directors**, with portfolios covering two or more of the key functions of the department.

Capacity building for the department could continue to be funded from grants earmarked for technical assistance. However, the Ministry should establish as a training policy that it will always seek to provide direct training opportunities to as many persons as possible, instead of personalized training that benefits only one individual at a time. This philosophy was presented in **Belize Sustainable Energy Action Plan Presentation 2015** in the recommendation to "invest in **capacity building** across the public institutions" and the "use of **digital media** for communication and collaboration."

3.2.3: IMPROVING ACCESS TO ENERGY INFORMATION

Empowerment of the management function of the energy sector is not limited to institutional empowerment or that of individuals within the institution. Therefore, the next stage of empowerment is founded on the universally accepted principle that "information is power," and by extension, access to information is power. As recommended in the Belize Sustainable Energy Strategy and Action Plan, 2015, the Ministry should support a process for intra-ministerial **data management** and **data sharing platforms** and protocols. This could be developed under the Public Sector Data Sharing Act, 2021[35] and the Belize Digital Government Bill, 2022,[36] and should not be left to one-off arrangements, or personal arrangements amongst colleagues. With support from the newly established E-Governance and Digitalization Department, the proposed Department of Energy could establish MOUs and data-sharing protocols for energy and energy-related data from other departments, including the Customs Department, Transport Department, and the Central Building Authority. Data sharing through automatic, secure system updates on a common platform managed by the e-governance department should be the preferred mode of information sharing.

Some of the most useful data comes from the service providers licensed to operate in the sector or related sectors. Regulations should be established, requiring these entities to share relevant information through periodic and timely reporting systems, as a condition of their license.

[35] Belize, National Assembly. "Public Sector Data Sharing Act, 2021," 2021

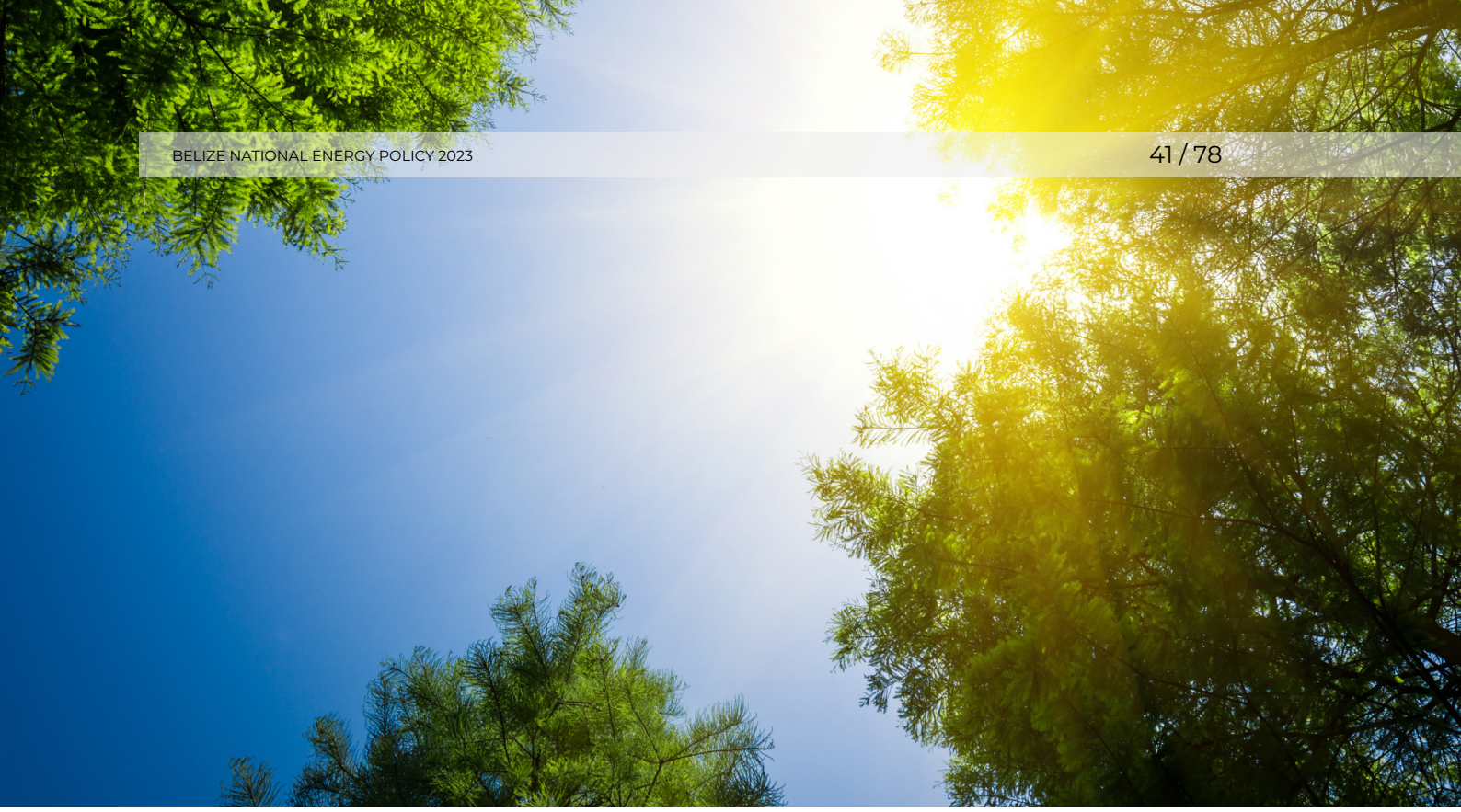
[36] Belize, National Assembly. "Belize Digital Government Bill, 2011"

In return, the Energy Department should publish Annual Reports on the sector in a timely manner, maintain an archive of these reports and other information accessible by the general public, and grant limited access to these licensed service providers for more specific and confidential information.

3.3: STIMULATE SOCIAL AND ECONOMIC DEVELOPMENT

Belizeans currently spend an estimated 21% of their earnings on their energy bill, proxied by the ratio of expenditures on secondary energy to the country's GDP. Consistent with the National Energy Policy Framework of 2011, reducing the cost of energy services remains a primary policy objective. Like any other bill, the total cost of a service is a function of the unit cost of the service or goods, the quantity of the service or goods procured, and the tax applied to the service. In a competitive environment, market forces continuously control the price of goods or services. For most energy commodities, Belize is part of a free-market system where the ability to switch suppliers of goods affects market demand and eventually influences the price. However, as a net importer of energy in small proportions compared to the global market, the country has limited control of its energy bill, which is determined by international market forces and shocks. The country would only be able to control the overall quantity of goods procured or the tax levied on the energy commodities, as measures taken to reduce demand and the tax taken will also reduce the energy bill.

The primary energy resources used in the Belizean market are butane, refined fuels, crude, biomass, solar electricity, hydroelectricity, and imported electricity. Butane and refined fuels are imported and subject to significant volatility on the global market on which a SIDS like Belize has absolutely no impact on world prices and very little impact on the unit cost of delivery. The same argument can be made for crude oil, which, by an unwritten government policy and local supply contracts, is referenced to the global market price. The unit cost of solar, biomass, and hydro have been agreed upon in power purchase agreements with the local distributor and are directly linked to investment costs for these technologies (equipment, development, and construction) and an approved rate of return. In some cases, there are also additional terms in these contracts that impact the current and future cost of these energy sources. In Belize, market knowledge, more than market forces, impacts the investment cost. In summary, citizens have almost no control over the unit costs of the imported energy resources, which accounted for 85% of the total acquisition cost of primary energy sources in 2021. Likewise, the locally sourced electrical energy sources have prices set by contractual agreements and are not governed by market forces.



3.3.1: REDUCING COST OF ENERGY SERVICES

Strategically, there are four actions that MPUELE can pursue in an attempt to reduce the expenditures on primary energy services which are:

1. Lower energy demand for primary energy resources.
2. Conduct research on least cost production of indigenous energy sources.
3. Facilitate and promote a further transition to indigenous energy sources. through a fair and competitive procurement process for viable energy projects.
4. Exploring fiscal incentives on blended fuel (**This action is worth considering but is completely outside the control of MPUELE**).
5. Facilitate the creation of an independent entity to ensure economic dispatch of energy.

The decision on taxation is up to the Ministry of Finance, and ultimately Cabinet; however, MPUELE can influence this decision through an inter-ministerial collaboration on the structure of these fiscal incentives.

A critical and often overlooked factor is that governments do not normally value their natural resources until they have been converted into more useful forms. For instance, the energy in solar rays is not valued until it is converted to energy, the energy stored in bagasse is not valued until it is converted to heat or electricity, and the water flowing through the rivers is not valued until it is converted into electricity. Therefore, little effort or attention is given to ensure that these energy sources are maximized and that losses are minimized during conversion. How the energy conversion is managed will determine the competitiveness of the energy produced from the indigenous resource.

3.3.1.1: LOWERING ENERGY DEMAND

Lowering energy demand and, more specifically, energy intensity starts with the end-user and is ultimately about finding the most efficient use of energy for the desired activity. Cross-sectoral solutions to reduce energy intensity in the transport sector would be for the government to:

1. **identify initiatives to reduce the percentage of commuters traveling for work and school** from approximately 75% to a modest 60% over a five-year period - especially those using private transport,
2. seek ways to **encourage commuters to shift from private transport to public transport** at an estimated average fuel consumption of 3 gallons per trip per person for private transport, compared to an estimated average of .5 gallons per trip per person for public transport,
3. **support the market transition from traditional ICE cars and SUVs to sustainable fuel and or electrified motor vehicles and non-motorized transportation** by improving road safety and mandating proper parking arrangements and increasing infrastructure to facilitate new technologies.

Cross-sectoral solutions for both the residential and commercial sectors, using electricity as its main energy source, should focus on the main energy used in homes and offices – refrigeration, lighting, and cooling by:

4. **adapting the CARICOM Regional Energy Efficiency Building Code and developing regulations to enable enforcement** by the Central Building Authority and Local Building Authorities to enforce these laws,
5. **develop and implement strategies to promote the transition to LED lighting and equipment with inverter motors,**
6. **develop regulations to enforce the labelling standards in the Energy Efficiency Labelling Scheme National Procedures Manual (Belize)[37].**

Additionally, for MPUELE and its support agencies, improvements in energy efficiency can be achieved by:

7. **mandating the introduction of time-of-use metering** to provide large customers with more detailed energy consumption information to help identify wastage,
8. **promote the use of technology to automate the running of appliances and major equipment** only when need to reduce waste,
9. **develop and administrate audit programs for new construction and large buildings** to ensure compliance with the building codes,

For the industrial sector, including BEL and IPPs, MPUELE can seek support from international agencies, and provide technical assistance to:

10. closely monitor the productivity of major plants and IPPs to ensure efficient energy transformation and production are maintained to reduce losses.
11. **Support feasible upgrades to the transmission and distribution grid to reduce line losses.**

[37] Belize Bureau of Standards (BBS). "Energy Efficiency Labelling Scheme (EELS)/National Procedures Manual," [Online]. Available: https://bbs.gov.bz/wp-content/uploads/2020/08/National-Procedures-Manual-EELS.pdf

3.3.1.2: RESEARCH THE FEASIBILITY AND PLAN FOR INDIGENOUS ENERGY RESOURCES

1. **Conduct feasibility studies for hydroelectricity and indigenous fuel sources (e.g., ethanol-based gasoline, biodiesel, and renewable diesel)** to reduce demand for imported energy,
2. **Investigate the feasibility of battery technology** as the most viable option to optimize electricity supply,
3. **Carefully study the life-cycle cost of electric vehicles compared to fossil fuel** to determine the rate of transition based primarily on economic factors, including the cost of stranded fuel distribution assets, and
4. **Initiate an IRRP for the entire energy sector every five years**, instead of an IRRP for the electricity sector only, based on projects that have already proven feasible.

These studies should seek to identify and prioritize initiatives to maximize the social and economic impact of the transition from imported fossil fuels to indigenous energy resources and should be used, along with prior studies on hydro, solar, and wind, to schedule the procurement process for new electricity generation and fuels.

3.3.1.3: FACILITATE FURTHER TRANSITION TO INDIGENOUS ENERGY SOURCES

1. **Initiate Requests for Proposals for Electricity Generation using solar and wind technologie**s under the proposed procurement structure and regulations, as soon as possible,
2. **Initiate Requests for Proposals for Biofuels** projects that proved to be feasible, to reduce consumption of imported fossil fuels, under the proposed procurement structure and regulations,
3. **Initiate Requests for Proposals for Waste-to-Energ**y projects to generate electricity using methane emitted from sanitary landfills, under the proposed procurement structure and regulations,
4. **Initiate Requests for Proposals for Battery Storage based on its economic feasibility**, under the proposed procurement structure and regulations,
5. **Promote the transition to electric vehicles based on its economic viability.**

3.3.2: UNIVERSAL ACCESS TO BASIC SERVICES AND IMPROVED ACCESS TO MODERN SERVICES

As stated in the Proposed National Strategy for Rural Electrification developed and presented in the LaitUp Belize! program for technical assistance and capacity building in the Energy Sector, access to energy services unlock opportunities for adding economic value to those unserved communities by creating local employment opportunities, improving livelihoods, reducing pressure on urban migration, and improve opportunities for women and children.

MPUELE can help to achieve this policy objective, by:

1. **committing to universal access to Tier 4 level service as a minimum standard** in accordance with the United Nations tiers of electrification.
2. **supporting the development of a comprehensive universal access progra**m, utilizing the more viable option between grid-tie or microgrid systems, and continuing to seek funding for these projects to meet this commitment,
3. **supporting the introduction of regulations on a net-billing electricity tariff structure that consists of an energy charge, demand charge, standby charge, and for DG installations a feed-in tariff based on avoided cost**
4. **supporting regulations to enforce the establishment of technical standards for grid connectivit**y that will not put the grid at risk, especially during storm conditions, and
5. **supporting regulations to enforce technical standards for micro-grid distribution networks**, inclusive of system resiliency during adverse weather conditions.

3.4: MEETING THE UPDATED NATIONAL DETERMINED CONTRIBUTION TARGETS

Historically, developing nations have a difficult time promoting investments in the energy sector primarily to save the environment since, for the most part, they were not the polluters. On the other hand, the argument can be made for making these investments primarily for the socio-economic benefits. Fortunately, most of the policy positions tailored to meet the social and economic policy objectives also contribute positively to UNDCs. As stated in the UNDC report, it is expected that Belize will avoid the emission of 5.6 MtCO2e between 2021 and 2030; however, the energy sector's contribution is only 0.2 MtCO2e. Nevertheless, it is imperative that the implementation of energy sector action plans to achieve the various policy positions commence now. In addition to the governance and socio-economic policy positions, the following policy positions speak specifically to this national commitment.

A strategic approach to managing this national commitment is rooted in the philosophy "what gets measured, gets done." Therefore, MPUELE should collaborate with the Department of Forestry and the Department of the Environment to achieve this policy objective by:

1. **Developing and promoting a government incentive program for key sectors' contributions to emission reduction goals financed by "climate funds" accessed by the government.**
2. **Developing an emissions tracking dashboard that keeps all ministries, international agencies, the media, and other key stakeholders updated on the level of emissions as frequently as possible.**

Government supports a collaborative, cross-sectoral approach to ensure that key stakeholders remain committed to the updated nationally determined contribution.

4. POLICY POSITIONS & RECOMMENDED ACTIONS AGENDA

INTRODUCTION

The Energy Agenda is explained in Section 3 by the Vision Statement, “To improve the country’s ability to effectively manage the energy sector, stimulate social and economic development through the energy sector and other cross-cutting sectors, and, improve the sector’s contribution to achieving Belize’s updated Nationally Determined Contribution," supported by the following clear policy statements outlining its commitment, including specific policy positions and recommended actions in support of the policy statements.

4.1: REDUCING COST OF ENERGY SERVICES

Government recognizes that reducing the cost of energy services is critical to stimulating social and economic development and is committed to:

1. Reducing energy intensity across all sectors through collaboration amongst key ministries, to successfully implement the following -

i. Introducing initiatives to reduce the percentage of commuters traveling for work and school by approximately 20% over a five-year period - especially those using private transport.
ii. Identifying and eliminating impediments to commuters accessing safe, comfortable, dependable, convenient, and economical public transport systems.
iii. Improving road safety and mandating proper infrastructure and parking arrangements for electrified motor vehicles to facilitate the recent market transition from traditional ICE private motor cars, SUVs, and pickup trucks to less energy-intense modes of commuting.
iv. Adapting the CARICOM Regional Energy Efficiency Building Code and developing regulations to enable effective enforcement.
v. Public education programs promoting the benefits of LED lighting, inverter motors, solar water heating, and other energy-efficient appliances and equipment.
vi. The development of regulations to enforce the labelling standards in the Energy Efficiency Labelling Scheme National Procedures Manual (Belize).
vii. Mandating the introduction of time-of-use metering for large electricity consumers and energy consumption reports for government vehicles.
viii. Introduction of regulations empowering the regulators to closely monitor energy conversion and production of major plants and IPPs and incentivize performance improvements.
ix. Fast-tracking of feasible upgrades to the utility grid, including LED streetlights, to reduce line losses and consumption.

4.2: INCREASE INDIGENOUS ENERGY SOURCES IN THE ENERGY SUPPLY MIX

Government recognizes that transitioning to indigenous energy resources is the most critical step to reducing costs, lowering the demand for foreign currency, developing new industries, and creating employment, and strongly supports:

2. Establishment of a mechanism for MPUELE to conduct research to determine project feasibility for all indigenous energy sources in collaboration with recognized and respected research institutions.

i. Lead the Integrated Energy Resource Planning process to plan for the development of energy projects every five years based on the R&D to determine project feasibility.
ii. Coordinate the development of a generation expansion plan based on the Integrated Energy Resource Plan every five years.
iii. Implement a fair and transparent procurement process to attract investments in producing and marketing indigenous biofuels for road and marine transport.
iv. The enabling of investments in the integration of e-mobility infrastructure into the power system.
v. The enabling and incentivizing of the importation and maintenance of electric vehicles.

3. Establishment of regulations for a fair and transparent procurement process for all new investments in the development of indigenous energy sources.

4. Investments primarily through private investments to increase local production of energy from the indigenous sources and to reduce the unit cost of these energy sources, and to ensure the viability of these investments, the government shall:

i. Pursue long-term regional markets for excess electricity produced from indigenous energy sources to benefit from economies of scale.
ii. Continue to support the production of competitive non-renewable energy resources over its projected life cycle, primarily for domestic consumption as blended fuels.

4.3: INCREASE ACCESS TO ENERGY SERVICES

Government is committed to universal basic energy services for all citizens and enterprises by 2030 to improve their quality of life and social development and shall support a comprehensive universal access program that utilizes the more viable grid-tie or microgrid solutions.

5. Government is committed to the creation of an enabling environment for citizens and enterprises to access clean and affordable energy services and shall support:

i. A tax regime that results in lower taxation on biofuels,
ii. Regulations on a net-billing electricity tariff structure that consists of an energy charge, demand charge, standby charge, and for DG installations, a feed-in tariff based on avoided cost,
iii. Regulations to enforce the establishment of technical standards for grid connectivity that will not put the grid at risk, especially during storm conditions, and
iv. Regulations to enforce technical standards for micro-grid distribution networks, inclusive of system resiliency in adverse weather conditions.

4.4: IMPROVE CONTRIBUTION TO THE UPDATED NATIONAL DETERMINED CONTRIBUTION

6. Government supports a collaborative, cross-sectoral approach to ensure that key stakeholders remain committed to the updated nationally determined contribution. MPUELE, the Department of Forestry, the Department of the Environment, and the Ministry of Economic Development shall work together to:

i. Develop and promote a government incentive program for key sectors' contributions to emission reduction goals financed by "climate funds" accessed by the government, and
ii. Support the development and update of an emissions tracking dashboard as outlined in Sections 4.1 and 8.2 of Belize's Updated Nationally Determined Contribution document.[38] This dashboard is expected to keep all ministries, international agencies, the media, and other key stakeholders updated on the level of emissions as frequently as possible.

4.5: IMPROVING GOVERNANCE IN THE ENERGY SECTOR

Government is committed to improving the governance of the energy sector and supports:

7. The creation of a government department, established in law, as the central governing body of the sector.

[38] Government of Belize, Ministry of Economic Development. "Belize Updated Nationally Determined Contribution," 2021

4.6: STRENGTHEN ENERGY MANAGEMENT CAPABILITIES

Government is committed to strengthening the MPUELE energy management capabilities to improve its delivery of the energy agenda and supports:

8. Establishment, in law, of an autonomous procurement agency with the responsibility to manage and administer the procurement for new or refurbished energy infrastructure or energy service.

9. Strengthening the role of the PUC to regulate all public utility providers and energy service companies to ensure compliance with

i. Minimum service and safety standards,
ii. minimum reporting requirements,
iii. lawful decisions made by the commission.

10. Establishment of a national energy company, owned by the government, to manage their current and new investments in the energy sector to meet the following investment objectives:

i. Generate adequate return on investment to
ii. Properly fund the Department of Energy, the Energy Management Information System, and the Government Procurement Agency.
iii. Help to fund energy access and transformation programs for citizens below the poverty line and in communities without access to safe, reliable, and quality electricity.
iv. Help fund research in energy optimization and transformation of indigenous energy resources that can improve Belize's competitiveness in the region for access to cheap, reliable, and quality energy for the industrial and service industry.
v. Help fund the STEM curriculum for the training and development of a semi-skilled and highly skilled technical workforce.
vi. Represent the government's interest in public-private partnerships.

4.7: INCREASE ACCESS TO ENERGY INFORMATION

Government recognizes that to make crucial decisions for the energy sector, stakeholders require access to energy information, and supports:

11. Establishment of a national energy management system, as an integral part of an e-government data management and data sharing platform by

i. Establishing data-sharing agreements and protocols with other government departments and agencies for access to energy data on their information systems platforms.
ii. Legislating new mandatory licensing reporting requirements to include industrial consumers, commercial enterprises classified as energy producers, or energy-intensive users. Organizing and promoting forums and associations which encourage and reward voluntary energy sharing.
iii. Establishing and managing systems for the public release of aggregated, anonymized energy information.

5. ENERGY SECTOR TARGETS

In establishing targets for the energy sector, it is important to recognize that these targets are computed based on the stated policies in this document. However, it is also important to note that efforts to achieve these targets will constantly be constrained or challenged by the current Business As Usual (BAU) scenarios, or the following scenarios as defined by the IEA World Energy Outlook 2022, namely: the Announced Pledges Scenario (APS) presented by the government, individual ministries, and their agencies at various international conferences and summits; and the Net Zero Emissions (NZE) scenario. To minimize potential conflicts in these scenarios, the targets established in the Updated Nationally Determined Contribution were accepted as a firm commitment by the government (i.e., Belize's APS), and, as a general rule, the sector targets computed based on the STEPS had to meet or exceed the targets established in the APS.

One key assumption made in developing the sector targets is that all stated policies would have been successfully implemented by 2030. As a result, the more significant improvements in the sector's performance would have already taken place by 2030. For instance, improvement in the governance structure, all relevant laws, and data sharing protocols listed in Policy Objectives #5 to #7, under the Policy Objectives outlined in Sections 4.5 to 4.7, are expected to be instituted by 2025. Whilst these do not have any direct bearing on the socio-economic or the climate change targets, implementation of these foundational decisions is key to the successful execution of the policies that directly impact energy intensity, the capacity to develop and complete these projects to introduce more indigenous energy sources in the supply mix, the achievement of universal access to basic energy services, access to modern energy services, and the reduction of GHG emissions.

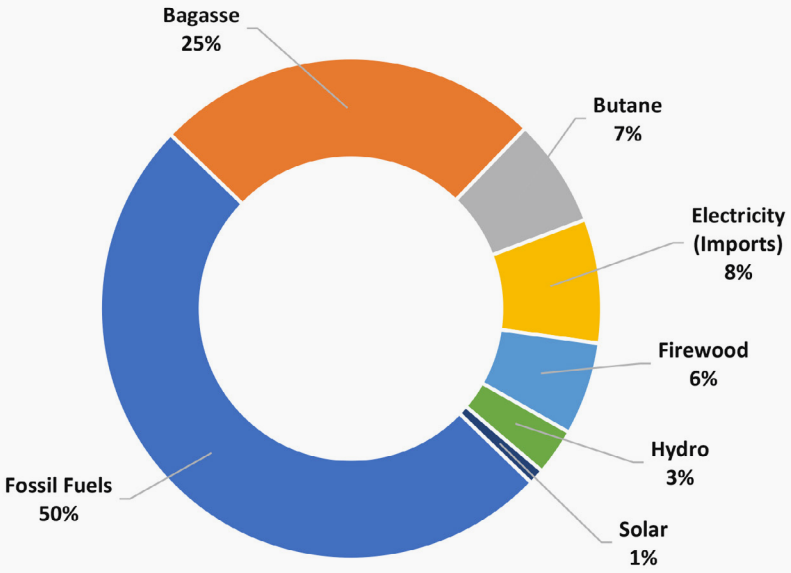
5.1: ENERGY TARGETS

For the period 2021 to 2030, the population is expected to rise by 20%, and GDP is projected at $6,574 million, directly impacting butane, fuel, and electricity for cooking, transport, cooling, heating, processing, lighting, etc. However, implementation of the policy to reduce energy intensity is expected to drive a 25% shift from private to public transport, facilitate the shift from traditional ICE cars and SUVs to sustainable fuel and or electrified motor vehicles and non-motorized transportation, and reduce energy consumption by 10% through energy efficiency initiatives; all noted in the specific policy position #1 under the Policy Objective outlined in Section 4.1. Successful implementation of this policy and related decisions is projected **to reduce energy intensity to 0.141 toe/USD000s of GDP with a total primary energy consumption of 19,440 TJ** (See Annex III).

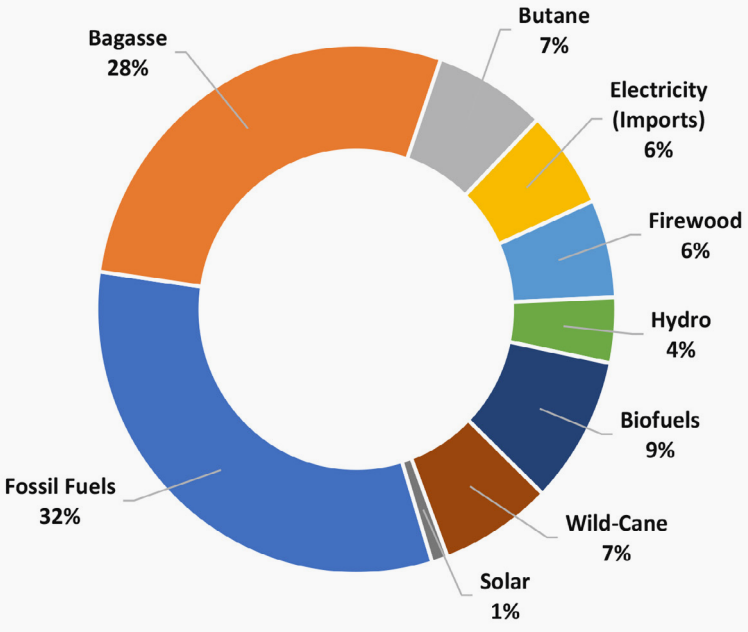
All currency is in $BZD unless stated otherwise

Timely implementation of policies under Sections 4.5, 4.6, and 4.7 sets the framework for successful implementation of policies under Sections 4.2 & 4.3, which is expected **to improve the energy supply mix to include biofuels, as well as more solar, hydro, and biomass and increase renewable energy penetration to 75% by 2030 and renewable energy electricity penetration of 75% by 2030** - mostly from indigenous energy resources as shown in the charts below. Likewise, the projection is for domestic energy to increase from 39% of total primary energy supply in 2021 to 57% in 2030 (see Annex I).

Energy Supply Mix - TPES 2021



Energy Supply Mix - TPES 2030

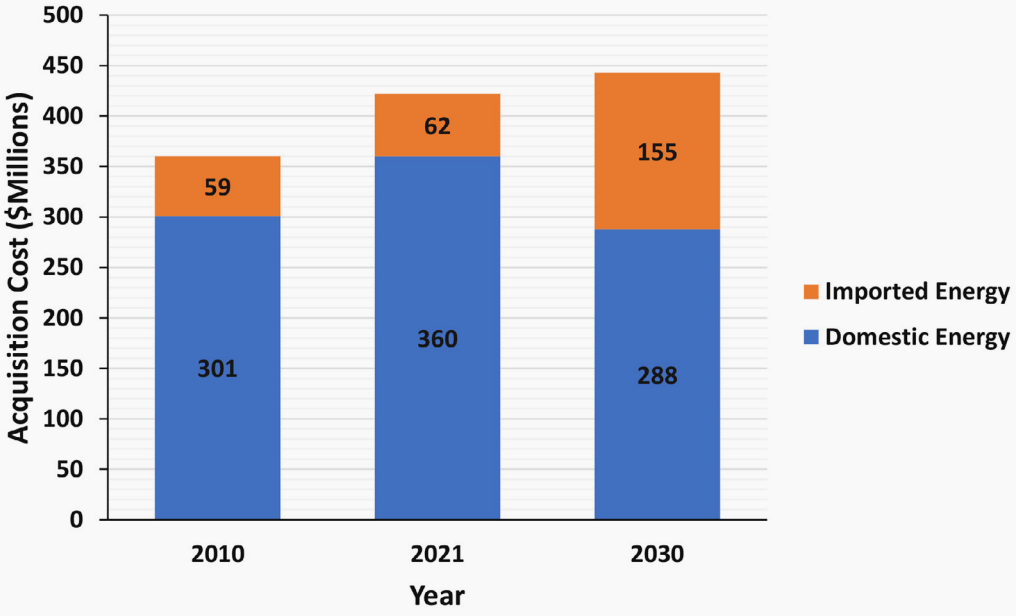


This sets the foundation for the introduction of wind, and e-mobility post 2030, to further increase renewable penetration to above 60% by 2040.

5.2: ECONOMIC TARGETS

The shift from private transportation and the procurement of power purchase agreements for new electricity generation are the two components of the NEP with the most impact on the economic targets and Belize's overall development goals. Even though these projects are at differing stages of their development, with the expected timely implementation of the relevant energy policies, **total energy-related expenditure is projected to increase to $993 million in 2030. This is a mere 7% increase compared to 2021, whilst GDP is expected to increase by 49% during this same period.** As a result, whilst energy expenditure amounted to 21% of GDP in 2021 (see Annex II), it would have reduced to a more manageable 15% of GDP by 2030 (see Annex III).

Whilst the procurement of processing contracts for biofuels is expected to reduce energy costs by about 3%, as shown in the chart below, this action will increase domestic energy production and have more significant social and economic benefits relating to increased employment in the agriculture and manufacturing sectors.

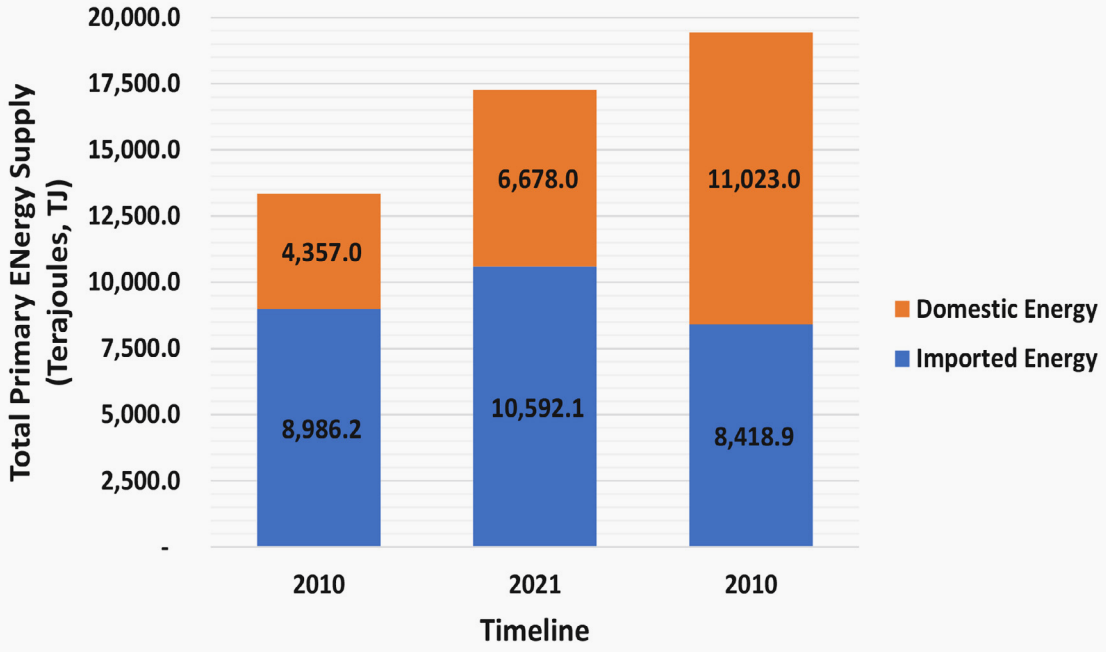


Additionally, the specific policy position on universal access to basic energy services is expected to have more significant social and economic benefits for marginalized communities that currently do not have access to affordable and reliable energy.

5.3: EMISSIONS TARGETS

Until MPUELE can gain Cabinet support for revisions to the UNDC based on the revised implementation schedule for the energy initiatives outlined in the integrated energy resource plans and the estimated reductions expected from each project, **MPUELE is committed to emission targets for the energy sector, based on the mitigation targets and actions listed in Section 6.2.3 of the UNDC.**

Estimates of the GHG Emissions are shown in the table below.



5.3.1: GREENHOUSE GAS EMISSIONS – TRANSPORT

A target to avoid 0.12 MTCO2e/year has been established for the transport sector based on an expected 15% reduction in fossil fuel consumption from 2020. To achieve this target, **MPUELE is committed to supporting the Ministry of Transport's plans to introduce hybrid and electric buses for public transportation by 2030 on the routes that will have the highest reduction of emissions.**

This program may be complemented by MPUELE's commitment to pursue viable indigenous biofuels to replace fossil fuels in the transport sector and to encourage a shift in transport modality from private to public transport.

5.3.2: GREENHOUSE GAS EMISSIONS – COMMERCIAL & RESIDENTIAL

A target to avoid 0.04 MTCO2e/year was established for the electricity sector through an increase in RE penetration from 2030. MPUELE is committed to conducting the required feasibility studies for all identified indigenous renewable energy resources and fast-tracking the procurement of new electricity generation and biofuels to increase RE penetration in the entire energy sector.

To avoid an additional 0.02 MTCO2e/year in GHG emissions, MPUELE committed to supporting the approval of all reasonable investments by BEL to reduce system losses from 12% to 10%, as any reduction in system losses also reduces energy cost.

All currency is in $BZD unless stated otherwise

6. KEY PERFORMANCE INDICATORS AND MONITORING SYSTEMS

The Energy Unit of MPUELE has been compiling annual energy balance data as it continuously monitors the performance of the sector. With the support of LaitUp Belize, it has also been releasing infographics highlighting key performance indicators for the sector. With the stated policy objectives and recommended actions supporting the detailed policy positions, it is expected that MPUELE will develop detailed plans to meet the short, medium, and long-term goals outlined in Section 5. More specifically, as the approved plans are being implemented, the Ministry must track the performance of the sector to assess if and how these plans are meeting the policy objectives outlined in Section 4 to determine if the government is on track to meet the energy targets outlined in Section 5. Therefore, the structure of the annual report and infographics are expected to be modified to align with the policy objectives.

The data being tracked and reported forms the key performance indicators (KPIs) for the sector. These KPIs are listed and explained below. However, the most critical next step in the monitoring and reporting of these KPIs is the development of the management information platform highlighted in Section 4.7.

Policy Objectives 5 – 7 are short-term objectives that are foundational and governance-related and are expected to be tracked by MPUELE and reported to Cabinet. These do not form a part of the sector KPIs, which are related to medium-term and long-term development goals and impact on climate change, as detailed in Policy Objectives 1 – 4.

POLICY OBJECTIVE #1:
REDUCE COST OF ENERGY SERVICES

Energy Intensity and energy cost as a percentage of GDP are determined to be two very critical factors affecting overall economic growth and cost of living. These KPIs are calculated as shown in the table below.

POLICY OBJECTIVE #2:
INCREASE INDIGENOUS ENERGY IN ENERGY

Every unit of indigenous energy produced for the sector displaces fossil fuels, thereby reducing demand for foreign exchange and increasing local employment. Therefore, the production of domestic energy (TJ) is calculated as a percentage of the total primary energy supply (TJ) and is determined to be a KPI.

POLICY OBJECTIVE #3:
INCREASE ACCESS TO ENERGY SERVICES

Universal access to basic energy services such as clean, safe, and reliable electricity is expected to spur the social and economic development of marginalized communities. This KPI is calculated based on the total number of houses located in a service area serviced by BEL's network or by a privately owned or publicly owned microgrid compared to the total number of houses in the country.

POLICY OBJECTIVE #4:
ACHIEVE THE UPDATED NATIONALLY DETERMINED CONTRIBUTION SUPPLY MIX

The energy sector is expected to be a key contributor to the reduction of the country's GHG emissions in order to meet the UNDC. This KPI is calculated as a function of the total primary energy supply of non-renewable products and the carbon dioxide emission factor of the non-renewable product.

THE KPIS AND EXPECTED BENEFITS FOR POLICY OBJ

POLICY OBJECTIVES	KEY PERFORMANCE INDICATORS
OBJECTIVE #1: Reduce Cost of Energy Services	Energy Intensity: – TPES (toe) / $000s GDP Energy Cost: - Total Energy Cost ($) x 100% / GDP ($)
OBJECTIVE #2: Increase Indigenous Energy in Energy Supply Mix	Domestic Energy: - DEP (TJ) x 100% / TPES (TJ) RE Penetration: - REP (TJ) x 100% / TPES (TJ)
OBJECTIVE #3: Increase Access to Energy Services	Percentage Access to Tier 4 Services: No. Houses in Service Zone % x 100% / Total No. of Houses in country
OBJECTIVE #4: Achieved updated NDC for sector	Energy Sector GHG Emissions: TPES (TJ) x CO2 Emission Factor (MTCO2e /TJ)

POLICY OBJECTIVES	EXPECTED BENEFITS
OBJECTIVE #1: Reduce Cost of Energy Services	• Improved Public Transport Services. • Reduction in Cost of Living. • Reduction in Foreign Currency Demand.
OBJECTIVE #2: Increase Indigenous Energy in Energy Supply Mix	• Increase in Investment Opportunities. • Increase in Agricultural Production. • Increase in Employment. • Reduction in Foreign Currency Deman.d
OBJECTIVE #3: Increase Access to Energy Services	• Minimize Risk of Electrical Hazards. • Improvement in Quality of Life.
OBJECTIVE #4: Achieved updated NDC for sector	• Improve economic benefits from climate bonds for GOB and Contributing Stakeholders. Development of best practices in collaboration amongst government ministries & agencies.

All currency is in $BZD unless stated otherwise

ECTIVES #1 – 4 ARE SUMMARISED IN THE TABLES BELOW.

2021	2030	2040
0.188TOE/$000S	0.144 TOE/$000S	0.110 TOE/$000S
21%	15%	12%
39%	57%	65%
36%	56%	75%
92%	100%	100%
0.8 $MTCO_2E$	0.6 $MTCO_2E$	0.5 $MTCO_2E$

7. RESOURCE MOBILIZATION

INTRODUCTION

The government's policy positions, and recommended actions were provided in Section 4; however, development of the policy is just one of the most crucial elements in the process. **Securing resources to successfully implement the stated policy actions is also critical for the success of this national energy plan** in achieving its stated goals in the vision statement. The recommended policy interventions must be categorized into different thematic areas, which may include technical assistance, legislative changes, and governance, among others. These actions, along with the scope of work for each, will be valued, and a budget developed by both financial officers and energy specialists, and where required, external expertise may be procured to aid in the costing of specific areas. The budget and expected timing of each action are important to make allowances for inflation and the availability of potential funding under specific arrangements.

Once a budget plan is established, the financing gaps will be identified, and potential development partners will be found based on the categories established. Selection of development partners will be based on how development funds are earmarked for specific purposes. Various activities in the budget plan may qualify for financing from these different sources, which would help diversify the investments. **A development partner mapping exercise will be carried out to prioritize potential financiers** based on size, scope, level of commitment, and type of financing. After the most likely development partners have been identified, the MOF and the MPUELE will engage these investors to propose their involvement in the NEP.

THE RECOMMENDED ACTIONS AND THEIR PRELIMINARY CATEGORIZATIONS FOR THE BUDGET EXERCISE ARE GIVEN BELOW.

RECOMMENDED ACTION	PRELIMINARY CATEGORY	COMMENTS
1. Creating a governing body for the energy sector.	• Governance • Legislation	Initial steps require legislation changes, additionally, investments are required for its staffing and operations.
2. Establishing an autonomous procurement agency with transparent processes.	• Governance • Legislation • Procurement	Enabling legislation is required, along with an operations budget.
3. Strengthening PUC's regulatory powers.	• Legislation • Tech. Assistance	Action is not capital intensive; however, staffing and training may be needed.
4. Establish an autonomous economic energy dispatch agency.	• Legislation • Tech. Assistance	Initial steps require legislation changes, additionally, investments are required for its staffing and
5. Establishing national energy management system.	• Governance • Procurement	Enabling legislation, staffing, and investment in hardware and software needed.
6. Reducing energy intensity across sectors. a. Increase public transport use. b. Reducing public transport costs (EV). c. Adapt CARICOM EE Building Code. d. Increase EE education. e. Modernize energy management.	• Communications • Procurement • Legislation • Education • Tax Legislation • Tech. Assistance	Communication, education, and sensitization budgets are needed. Investments or fiscal incentives are to be provided for EV, EE, & modern energy monitoring equipment procurements. Fiscal incentives for EE adaptation from end-users. Capacity building for EE, EV, and modernization activities.
7. Increasing indigenous energy sources. a. Conduct feasibility studies. b. Coordinate Integrated energy resource plan. c. Enabling investment in E-mobility infrastructure. d. Enabling investment in EV importation.	• R&D • Tech. Assistance • Procurement • Taxation Policy	Research budget required for feasibility and enabling studies, technical assistance needed for integrated energy resource planning. Fiscal incentives for investments in e-mobility infrastructure.

8. Increasing production of indigenous energy sources.	• Tech. Assistance • Legislation • RE Procurement	Capacity building to enable systems management for new RE resources. Fiscal incentives for investments in indigenous production capacity.
9. Access to clean and affordable energy sources. a. Lower taxation on biofuels. b. Establish regulations for DG, grid connectivity standards, and micro-grid distribution networks.	• Taxation Policy • Legislation • Tech. Assistance	Incentives for investment in bio-fuel production and DG adaptations. Changes in legislation and regulations for DG, biofuels, grid connectivity, and microgrids.
10. Commitment to UNDCs.	• Taxation Policy • Procurement	Incentives for government department commitment to UNDCs. Procurement of hardware and software for emissions tracking dashboard.

7.2: REQUIRED INVESTMENTS

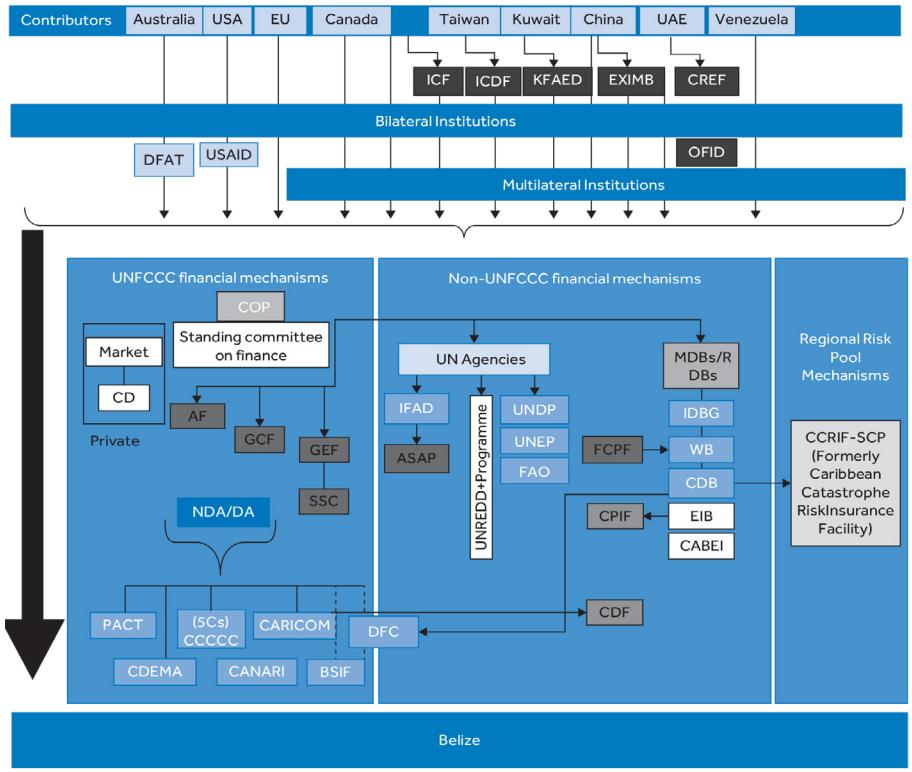
The strategic actions recommended in this national energy policy initially call for various changes in legislation and regulations for the formation of specific bodies, and changes in the current energy framework to enable the foreseen activities. These changes would not be extremely capital-intensive besides the legal drafting required to change laws, as the local energy specialists should be able to provide the recommended changes in regulations and current operations. **Where the policy calls for the establishment of new entities, including the procurement agency, among others, is when new financing becomes paramount** as they require the hiring of a new and larger staff complement than the current energy unit, establishing new or expanding offices, hardware and software investments, and capital to finance the entity's operations. **The NEP is recommending an investment company, the national energy company, which would require the largest capital infusion**, though revenues generated may help fund the venture. The Government is mostly tasked with creating the enabling environment for energy efficiency, distributed generation, biofuel production, and other indigenous energy production, among other elements of the energy sector functions. **These enabling environments are very important, as they are needed to promote local and foreign investments in the capacity needed for Belize to achieve its economic and environmental goals.** The government is not expected to finance these investments on its own, and it will be left to the private sector to meet industry demands for energy and energy products. The changes in tax policy or other motivations at the disposal of the government are going to encourage massive investments in renewable energy productive capacity, energy-efficient appliances, and distributed generation, among others, and eventually change the energy mix, reduce energy intensity, and allow Belize to experience economic growth and at the same time protect the environment.

7.3: POTENTIAL DEVELOPMENT PARTNERS

The activities listed in the NEP are mostly related to energy saving, indigenous energy production, and meeting the UNDCs, and most could be funded by what is referred to as "Climate Finance." Climate Finance is defined by the UNFCC[39] as "local, national or transnational financing—drawn from public, private and alternative sources of financing—that seeks to support mitigation and adaptation actions that will address climate change." As mentioned, the funds for the various policy activities may come from various sources, including the MPUELE, external financing agencies, non-government organizations, and the private sector, among others. The Government of Belize may be able to provide a dedicated amount of funding; however, the current fiscal outlook indicates a need for borrowing of $243.0mn over the medium term (Prime Minister's Budget Speech 2022/23[40]), and as such, finances may be limited.

Government Counterpart Financing of Climate Investments in Belize between 2015 and 2019 was approximately 9% over the period (Climate Finance Landscape of Belize, 2019[41]). Climate Funds made up about 11% of the financing provided to the country between 2015 and 2019, which can easily be increased given capacity improvements. Local private sector involvement in funding climate initiatives in Belize was the lowest among tracked resources at about $14.0mn BZD (3%) between 2015 and 2019, and these should be encouraged as well. Most of the financing for climate projects came from Multilateral Development Banks (39%) and Bilateral development partners (21%).

The National Climate Finance Strategy of Belize outlines the climate finance architecture of Belize in the diagram below:



[39] https://unfccc.int/topics/introduction-to-climate-finance

[40] Prime Minister's Budget Speech for Fiscal Year 2022/2023

[41] Climate Finance Landscape of Belize 2015–2019

Potential development partners who may be beneficial to the energy policy include the IDB Group, whose Country Strategy for 2022 - 2025 includes focusing on areas like digitalization, institutional capacity, and investments in human capital while having ongoing projects including promoting Green Finance for RE and EE for MSMEs. The Caribbean Community Climate Change Center has also funded various climate activities in Belize, including strengthening local capacity to manage and mobilize climate finances to achieve the goals related to national strategies. According to the Climate Finance Landscape of Belize (2019), "Seven GCF readiness support projects with a national focus are being implemented at the moment in Belize while there are several regional readiness supports, which is impressive progress to capitalize on the largest dedicated global climate fund." Belize can do better to mobilize the Green Climate Fund and increase its contribution to our local strategies, with energy being a main recipient. The World Bank Group, in its Climate Change Action Plan 2021-2025[42] (2021), also plans to support clean energy transitions, power system planning, and energy efficiency activities, among others, to assist with mitigating the impact of climate change over the period. Belize can also benefit from establishing a relationship with the group to achieve the goals of the energy policy.

7.4: COMMITMENT TO GENDER EQUALITY IN THE ENERGY SECTOR

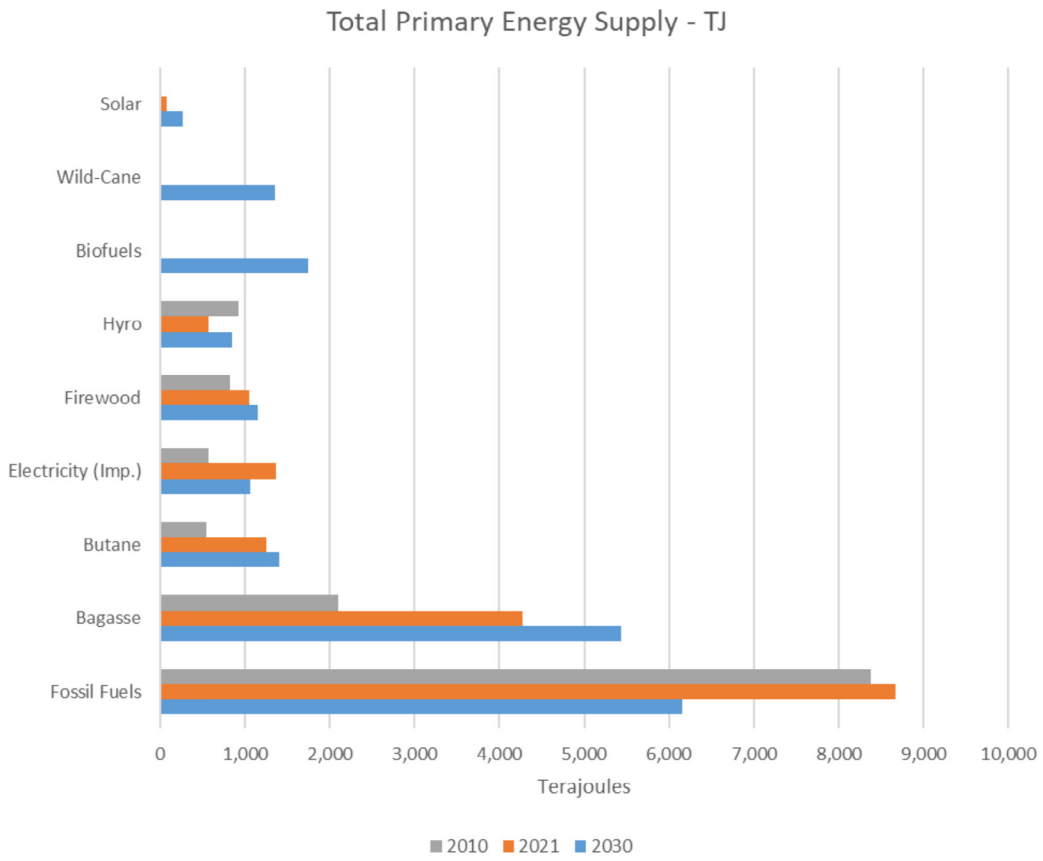
Through its work with its development partners, Belize has consistently reiterated its commitment to Goal 5 of the SDGs to transform the lives of women and girls as well as the structures that perpetuate gender-based discrimination. This commitment was listed in the Description of Programs or Projects in the #planBelize Medium-Term Development Strategy[43]. In support of this commitment, MPUELE is committed to introducing programs to help achieve this goal. MPUELE will be expected to drive the national agenda to give more emphasis on science, technology, engineering, and mathematics in primary and high schools and set the foundation required to take advantage of employment opportunities in the sector. Currently, it is generally assumed that more men are trained in these areas. The MPUELE can help to develop strategies to support the Ministry of Education in its effort to facilitate the transfer of knowledge and experience required to prepare more females for work in the energy sector. It would be useful to support this with data through surveys or employment statistics, so that a targeted approach can be developed during implementation of the energy policy.

[42] https://openknowledge.worldbank.org/entities/publication/ee8a5cd7-ed72-542d-918b-d72e07f96c79?intcid=ecr_hp_headerDD_en_ext

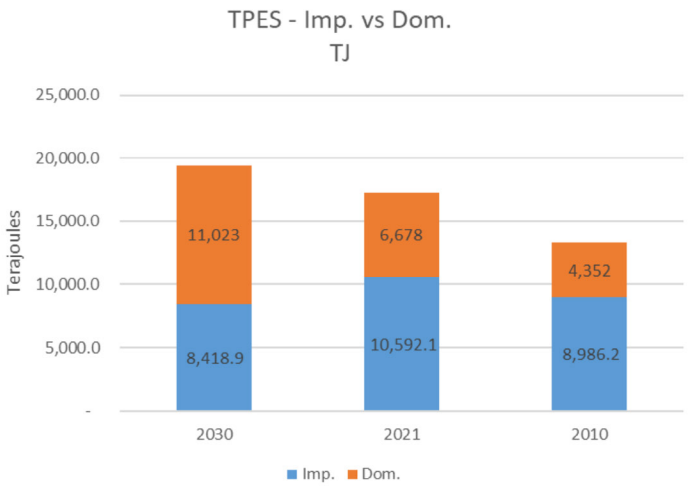
[43] Government of Belize, Ministry of Economic Development. "Belize Medium-Term Development Strategy 2022 – 2026" [Online], Available: https://med.gov.bz/wp-content/uploads/2023/04/Belize-Med-Term-Dev-Stategy-Action-Plan-2022-to-2025.pdf

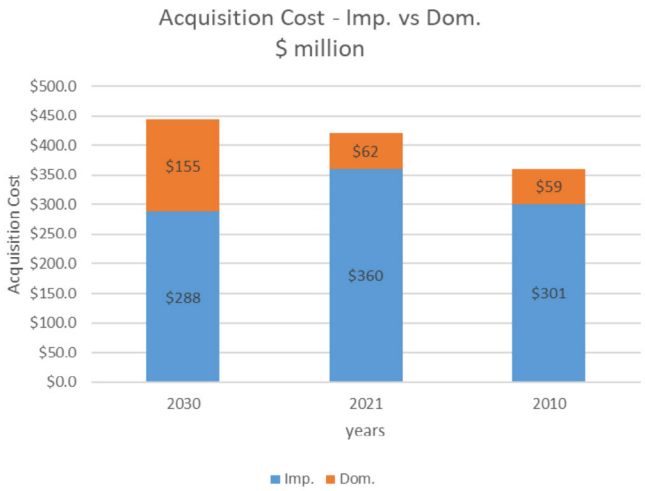
ANNEX I

PRIMARY ENERGY SUPPLY – ENERGY MIX



PRIMARY ENERGY SUPPLY – IMPORTED ENERGY VS DOMESTIC





All currency is in $BZD unless stated otherwise

ANNEX II

PROGRESS IN THE ENERGY SECTOR – 2021 VS 2010 SECONDARY ENERGY SUPPLY

Secondary Energy by Sector - Terajoules								
Year/Energy Sources	Petroleum Gas	Fuels	Electricity	Heat	Biofuels	Natural Gas	Total	%
2010								
Secondary Energy	**546.6**	**5,598.2**	**2,264.9**	**1,787.4**	**830.0**	**0.0**	**11,027.1**	**100%**
Transport & Agriculture	27.3	5,598.2	-	-		-	5,625.5	51%
Residential & Road Lighting	325.2	-	691.4	-	332.0	-	1,348.6	12%
Commercial & Public Service	139.4	-	993.1	-	498.0	-	1,630.5	15%
Manufacturing & Agro-Processing	54.7	-	580.4	1,787.4	-	-	2,422.5	22%
2021								
Secondary Energy	**1,257.7**	**6,951.1**	**2,899.3**	**1,698.9**	**1,054.5**	**28.7**	**13,890.2**	**100%**
Transport & Agriculture	188.6	6,951.1	-	-	-	-	7,139.7	51%
Residential & Road Lighting	660.3	-	1,172.6	-	421.8	-	2,254.7	16%
Commercial & Public Service	283.0	-	1,150.7	-	632.7	-	2,066.4	15%
Manufacturing & Agro-Processing	125.8	-	576.0	1,698.9	-	-	2,400.7	17%

ANNEX II

Market Value of Secondary Energy by Sector - $

Year/Energy Sources	Petroleum Gas	Fuels	Electricity	Heat	Biofuels	Natural Gas	Total	%
2010								
Secondary Energy - Market Value	**$ 27,574,216**	**$ 365,673,352**	**$ 251,395,011**	**$ 94,429,893**	**$ -**	**$ -**	**$ 739,072,472**	**100%**
Transport & Agriculture	$ 1,429,464	$ 365,673,352	-	-	-	-	$ 367,102,816	50%
Residential & Road Lighting	$ 18,031,260	-	$ 76,287,292	-	-	-	$ 94,318,552	13%
Commercial & Public Service	$ 6,917,653	-	$108,074,233	-	-	-	$ 114,991,886	16%
Manufacturing & Agro-Processing	$ 1,195,839	-	$ 67,033,486	$ 94,429,893	-	-	$ 162,659,218	22%
Unit Market Value - $/TJ	*$ 50,456*	*$ 65,319*	*$ 110,996*	*$ 52,832*	$ -	$ -	**$ 67,024**	
2021								
Secondary Energy - Market Value	**$ 62,482,856**	**$ 500,474,542**	**$ 274,596,700**	**$ 85,867,023**	**$ -**	**$ -**	**$ 923,421,121**	**100%**
Transport & Agriculture	$ 9,868,758	$ 500,474,542	-	-	-	-	$ 510,343,300	55%
Residential & Road Lighting	$ 36,613,092	-	$111,973,807	-	-	-	$ 148,586,899	16%
Commercial & Public Service	$ 14,046,532	-	$110,010,026	-	-	-	$ 124,056,558	13%
Manufacturing & Agro-Processing	$ 1,954,474	-	$ 52,612,867	$ 85,867,023	-	-	$ 140,434,364	15%
Unit Market Value - $/TJ	*$ 49,680*	*$ 71,999*	*$ 94,711*	*$ 50,541*	$ -	$ -	***$ 66,480***	

2021 GDP = BZ$ 4,398,362,291
% of GDP = 21.2%

Overall Energy Intensity = 0.188 toe/ US$000 of GDP

All currency is in $BZD unless stated otherwise

ANNEX III

Secondary Energy by Sector - TJ
2030 Projections

Energy Sources	Petroleum Gas	Fuels	Electricity	Heat	Biofuels	Natural Gas	Total	%
Secondary Energy (TJ)	**1,435.3**	**7,104.5**	**3,189.2**	**2,505.2**	**803.6**	**-**	**15,037.8**	**100%**
							10%	
Transport & Agriculture	207.5	7,104.5					**7,312.0**	49%
Residential & Road Lighting	825.3		1,307.1		339.6		**2,472.0**	16%
Commercial & Public Service	339.6		1,311.7		464.0		**2,115.3**	14%
Manufacturing & Agro-Processing	62.9		570.4	2,505.2			**3,138.5**	21%

Energy Sources	Petroleum Gas	Fuels	Electricity	Heat	Biofuels	Natural Gas	Total	%
Market Value ($BZD)	**$ 68,381,675**	**$ 530,012,552**	**$ 292,561,765**	**$ 103,737,420**	**$ -**	**$ -**	**$ 994,693,413**	**100%**
							6%	
Transport & Agriculture	$ 10,855,634	$ 530,012,552					**$ 540,868,186**	58%
Residential & Road Lighting	$ 40,869,364		$ 124,244,343				**$ 165,113,707**	18%
Commercial & Public Service	$ 15,679,441		$ 124,672,981				**$ 140,352,422**	15%
Manufacturing & Agro-Processing	$ 977,237		$ 43,644,442	$ 103,737,420			**$ 148,359,098**	16%

Unit Market Value ($BZD/TJ)	47,643	74,602	91,734	41,408		66,146

2030 GDP = BZ$ 6,574,641,490
% of GDP = 15.1%

Overall Energy Intensity = 0.141 toe/ US$000 of GDP

ANNEX IV

ENERGY FLOW AND CASH FLOW - 2010

Electricity (by Fuel Type)	Jurisdiction	Technology	Electricity (kWh)		COP - $		Taxes - $	Revenue - $		Energy Produced - TJ	
	TOTAL		**629,140,978**		**$ 160,201,967**		**$ 10,549,333.00**	**$ 246,592,349.00**	**33.6%**	**2,265**	**17.3%**
	BEL		**486,306,000**	**77.3%**	**$ 105,493,330**	**65.9%**	**$ 10,549,333**	**$ 190,526,000**		**1,750.7**	
Fuel Oil		Internal Combustion Engine (ICE)	4,461,000		$ 2,133,250					16.1	
Diesel		Internal Combustion Engine (ICE)	16,622,000		$ 9,878,455					59.8	
Bagasse		Co-generation	48,175,000		$ 9,047,265					173.4	
Solar		Photo-voltaic Panels									
Hydro		Turbine	257,172,000		$ 49,325,590					925.8	
Comisión Federal de Electricidad (CFE)		Substation	159,876,000		$ 35,108,770					575.6	
	Own-Use		**133,229,655**	**21.2%**	**$ 51,263,688**	**32.0%**	**$ -**	**$ 51,263,688**		**479.7**	
Crude		Internal Combustion Engine (ICE)	8,298,972		$ 2,976,426			$ 2,976,426		29.9	
Diesel		Internal Combustion Engine (ICE)	61,070,799		$ 36,294,376			$ 36,294,376		219.9	
Butane		Internal Combustion Engine (ICE)									
Bagasse		Co-generation	63,859,884		$ 11,992,886			$ 11,992,886		229.9	
	FLP		**9,605,323**	**1.5%**	**$ 3,444,949**	**2.2%**	**$ -**	**$ 4,802,661**		**34.6**	
Crude		Internal Combustion Engine (ICE)	9,605,323		$ 3,444,949			$ 4,802,661		34.6	

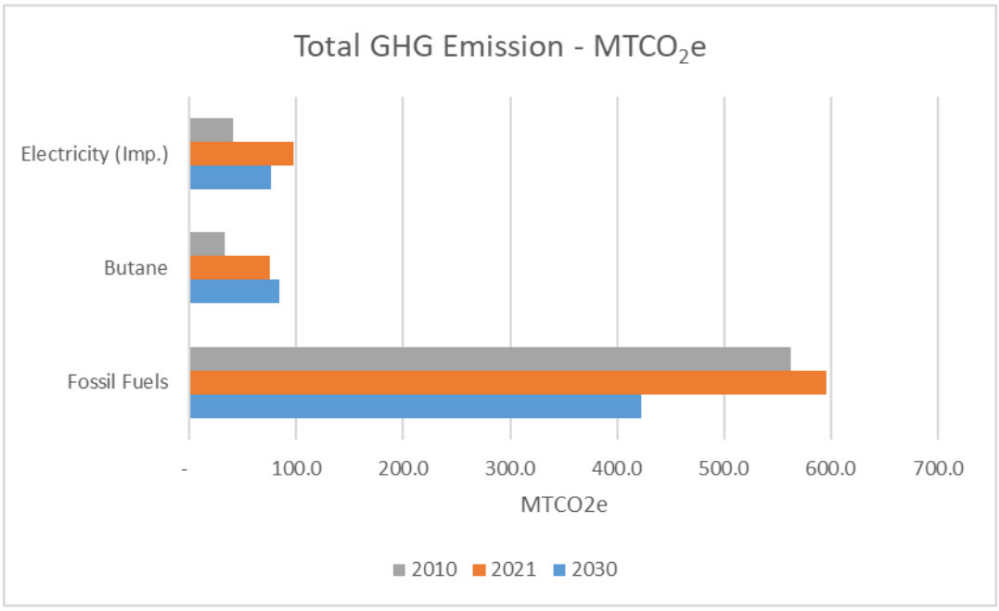
ENERGY FLOW AND CASH FLOW – 2021

Electricity (by Fuel Type)	Jurisdiction	Technology	Electricity (kWh)		COP - $		Taxes - $	Revenue - $		Energy Produced - TJ	
	TOTAL		**805,364,718**		**$ 180,318,970**	**43%**	**$ 13,652,512.00**	**$ 274,596,700.00**	**29.6%**	**2,899.1**	**16.8%**
	BEL		**667,840,749**	**82.9%**	**$ 136,525,124**	**75.7%**	**$ 13,652,512**	**$ 228,540,000**		**2,404.1**	
Fuel Oil		Internal Combustion Engine (ICE)	39,927,311		$ 19,093,240					143.7	
Diesel		Internal Combustion Engine (ICE)	11,675,597		$ 6,669,819					42	
Bagasse		Co-generation	57,481,821		$ 10,411,678					206.9	
Solar		Photo-voltaic Panels	20,941,135		$ 2,799,830					75.4	
Hydro		Turbine	157,619,971		$ 42,042,100					567.4	
Comisión Federal de Electricidad (CFE)		Substation	380,194,914		$ 55,508,457					1368.7	
	Own-Use		**121,515,097**	**15.1%**	**$ 38,052,264**	**21.1%**	**$ -**	**$ 38,052,264**		**437.4**	
Crude		Internal Combustion Engine (ICE)	12,524,746		$ 4,492,000			$ 4,492,000		45.1	
Diesel		Internal Combustion Engine (ICE)	35,421,002		$ 20,234,654			$ 20,234,654		127.5	
Butane		Internal Combustion Engine (ICE)									
Bagasse		Co-generation	73,569,349		$ 13,325,610			$ 13,325,610		264.8	
	FLP		**16,008,872**	**2.0%**	**$ 5,741,582**	**3.2%**	**$ -**	**$ 8,004,436**		**57.6**	
Crude		Internal Combustion Engine (ICE)	16,008,872		$ 5,741,582			$ 8,004,436		57.6	

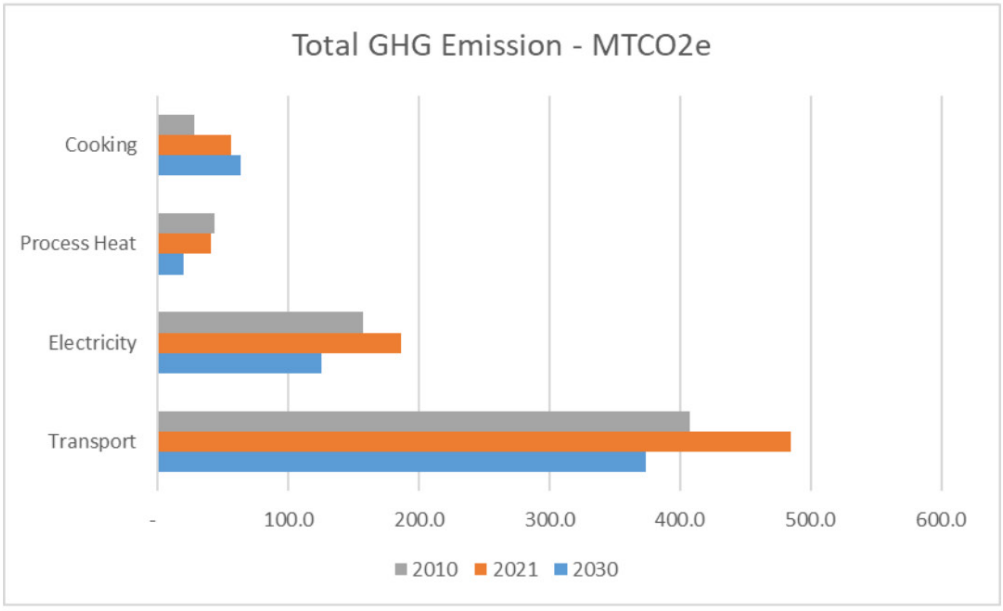
All currency is in $BZD unless stated otherwise

ANNEX V

GREENHOUSE GAS EMISSIONS ESTIMATES



Estimated Emissions by Energy Source



Estimated Emissions by End-user Application

Fuel Price Build Up (2012 to 2021)

Premium

Year	Landed Cost ($BZD/AG)	Landed Cost % of Pump Price	GOB Taxes ($BZD/AG)	GOB Taxes % of Pump Price	Total Commercial Charges $BZD	Total Commercial Charges % of Pump Price	Pump Price $BZD
2012	$ 6.7610	58%	$ 3.4583	29%	$ 1.5326	13%	$ 11.7519
2013	$ 6.5644	55%	$ 3.7787	32%	$ 1.5239	13%	$ 11.8669
2014	$ 6.2417	57%	$ 3.2967	30%	$ 1.4760	13%	$ 11.0143
2015	$ 4.3079	47%	$ 3.6097	39%	$ 1.2949	14%	$ 9.2124
2016	$ 3.8326	39%	$ 4.6344	47%	$ 1.3467	14%	$ 9.8138
2017	$ 4.4417	41%	$ 4.9362	46%	$ 1.4327	13%	$ 10.8106
2018	$ 4.8585	43%	$ 5.0704	44%	$ 1.4848	13%	$ 11.4137
2019	$ 4.3648	41%	$ 4.9627	46%	$ 1.4317	13%	$ 10.7588
2020	$ 3.4500	36%	$ 4.8818	50%	$ 1.3842	14%	$ 9.7159
2021	$ 4.9600	43%	$ 5.0846	44%	$ 1.4959	13%	$ 11.5421

Kerosene

Year	Landed Cost ($BZD/AG)	Landed Cost % of Pump Price	GOB Taxes ($BZD/AG)	GOB Taxes % of Pump Price	Total Commercial Charges $BZD	Total Commercial Charges % of Pump Price	Pump Price $BZD
2012	$ 7.0033	83%	$ -	0%	$ 1.1171	13%	$ 8.4824
2013	$ 6.7065	75%	$ -	0%	$ 1.0866	12%	$ 8.9579
2014	$ 6.5249	75%	$ -	0%	$ 1.0677	12%	$ 8.7374
2015	$ 4.1376	72%	$ -	0%	$ 0.8153	14%	$ 5.7747
2016	$ 3.3581	70%	$ -	0%	$ 0.7327	15%	$ 4.8047
2017	$ 3.9929	71%	$ -	0%	$ 0.8000	14%	$ 5.5945
2018	$ 4.9419	64%	$ 1.8346	24%	$ 0.9846	13%	$ 7.7611
2019	$ 4.4902	60%	$ 2.0741	28%	$ 0.9648	13%	$ 7.5291
2020	$ 3.6485	56%	$ 1.9577	30%	$ 0.8756	14%	$ 6.4818
2021	$ 4.4640	60%	$ 2.0705	28%	$ 0.9621	13%	$ 7.4965

All currency is in $BZD unless stated otherwise

ANNEX VI

Regular

	Landed Cost		GOB Taxes		Total Commercial Charges		Pump Price
Year	($BZD/AG)	% of Pump Price	($BZD/AG)	% of Pump Price	$BZD	% of Pump Price	$BZD
2012	$ 6.4775	57%	$ 3.3019	29%	$ 1.3209	12%	$ 11.2702
2013	$ 6.3569	56%	$ 3.5961	31%	$ 1.3048	11%	$ 11.4434
2014	$ 6.0909	55%	$ 3.5083	32%	$ 1.5388	14%	$ 11.0549
2015	$ 3.9609	47%	$ 3.2850	39%	$ 1.7993	21%	$ 8.4713
2016	$ 3.5375	40%	$ 4.1475	46%	$ 1.9640	22%	$ 8.9533
2017	$ 4.1624	41%	$ 4.5192	45%	$ 2.1485	21%	$ 10.0476
2018	$ 4.6510	43%	$ 4.6627	43%	$ 2.3177	22%	$ 10.7412
2019	$ 4.1308	41%	$ 4.5901	45%	$ 0.7810	8%	$ 10.0907
2020	$ 3.4905	37%	$ 4.5056	48%	$ 0.6293	7%	$ 9.3290
2021	$ 4.8002	44%	$ 4.6833	43%	$ 0.8001	7%	$ 10.9280

Diesel

	Landed Cost		GOB Taxes		Total Commercial Charges		Pump Price
Year	($BZD/AG)	% of Pump Price	($BZD/AG)	% of Pump Price	$BZD	% of Pump Price	$BZD
2012	$ 6.8011	64%	$ 2.4348	23%	$ 1.3793	13%	$ 10.6152
2013	$ 6.5737	62%	$ 2.5966	25%	$ 1.3536	13%	$ 10.5239
2014	$ 6.2509	62%	$ 2.5653	25%	$ 1.3171	13%	$ 10.1332
2015	$ 3.9562	55%	$ 2.2520	31%	$ 1.0482	14%	$ 7.2563
2016	$ 3.2778	41%	$ 3.6798	46%	$ 1.1255	14%	$ 8.0830
2017	$ 3.8251	42%	$ 4.1022	45%	$ 1.2254	13%	$ 9.1528
2018	$ 4.7986	46%	$ 4.3151	41%	$ 1.3478	13%	$ 10.4616
2019	$ 4.4904	45%	$ 4.2339	42%	$ 1.3055	13%	$ 10.0298
2020	$ 3.1985	38%	$ 4.0968	48%	$ 1.2016	14%	$ 8.4969
2021	$ 4.6943	45%	$ 4.3004	42%	$ 1.3354	13%	$ 10.3294

Estimate of Investments/Interest In Ene

Company	Business Type	Asset Value - $BZD Millions
Belize Electricity Limited	Utility	$ 591.49
Farmer's Light Plant Corporation	Utility	
National Gas Company (Belize)	Supplier	$ 60.00
PUMA Energy Belize	Supplier - Fuel	
Uno Belize	Distributor - Fuel	
SOL Belize Limited	Distributor - Fuel	
Belize Natural Energy	Producer - Crude	
BECOL - Fortis Belize	Independent Power Provider (IPP)	
VACA	Independent Power Provider (IPP)	$ 90.00
Santander Sugar Energy	Independent Power Provider (IPP)	
BELCOGEN	Independent Power Provider (IPP)	$ 69.43
Blair Athol Power Company Limited (BAPCOL)	Independent Power Provider (IPP)	$ 32.00
Hydro Maya Limited	Independent Power Provider (IPP)	
JICA	Independent Power Provider (IPP)	$ 10.00
Paradise Shrimp	Prosumer	

	$BZD Million	
Foreign Investment	$	356.40
GOB Investment	$	402.67
Local Investment	$	34.86

Belize Sugar Industry Limited (BSIL) is a local company owned by the ASR-Group International, Inc, which is owned
Social Security Board (SSB)

All currency is in $BZD unless stated otherwise

ANNEX VII

rgy Sector

Estimated Shareholdings by Investor									
Government of Belize	Social Security Board	Fortis Belize	PUMA Energy Bahamas	Uno	Parkland Corporation	Belize Sugar Industry Limited (BSIL)	BWT Holdings	Bowen & Bowen	Local
33%	31%	33%							3%
25%							39%	6%	30%
			100%						
				100%					
					100%				
		100%							
		100%							
						100%			
								100%	
100%									

217.71	184.96	286.97			69.43	23.4	35.6	34.86

d by Florida Crystals Corporation and Sugar Cane Growers Cooperative

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