

Traducción libre realizada por Mónica Romero

Energy Policy 2013-2027

Energy for Development

Quality Quantity Competitiveness

Presidency of the Republic of Guatemala
Ministry of Energy and Mines

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Presentation

The Energy Policy has been updated in order to strengthen the conditions that it requires for the country to be competitive, efficient and sustainable in the use and exploitation of resources. This is part of a globalized society that prioritizes the vision of the State to focus on the conservation of national strategic reserves, satisfaction of needs, and technological development. Thus, human development is a fundamental key of this policy.

This public instrument is aimed to reinforce the existing institutional structure of the energy sector, and to improve interagency coordination, in order to transform the energy matrix into renewable resources.

The energy sector is formed by two subsectors: electricity and hydrocarbons. Consequently, this public instrument is oriented to give an integral focus of the energy sector. As a result, it is important to update the strategies and operational actions from territorial, decentralized, point of view; in addition to implement a management by results; to promote actions in favor of sustainable development and competitiveness approach. In this way, the requirements and interests of citizens, domestic market, and international market volatility, should be address.

The Ministry of Energy and Mines (MEM), as the ruling institution of the energy sector in Guatemala, aware of the importance of energy as a mechanism for development, has identified the need to update this public policy. It prioritizes the use of clean and environmentally friendly energy resources for local consumption. Moreover, it urges for interagency dialogue in order to conduct democratically social and economic development initiatives, which seeks to ensure a comprehensive approach in the implementation, monitoring and evaluation of the public policy.

The update of the Energy Policy for the period 2013-2027 considered new challenges of the international and national energy dynamics, such as the response to social demands, the need to improve the economic conditions of the country, to ensure a responsible management of environment, and the capacity of the State to guarantee the welfare of its population.

This policy is the result of the construction of a long-term national vision, in which the State of Guatemala drives through the commitment of all sectors of society, with the purpose of defining it as the basis for the planning of energy development. In this context, the contribution of the Energy Policy for the development of the country will also depend on joint actions and coordination with stakeholders from public and private sectors, as well as the active participation of citizens in this process. In the same way, this policy will define the vision of development through the coordinated implementation with other economic, social and environmental public policies.

Introduction

The Energy Policy aims to contribute to the country's sustainable energy development with social equity and respect for the environment. This is the result of a technical, methodological and political review process required to enhance the institutionalism and leadership of the Ministry of Energy and Mines, as well as of the agencies related to the energy sector.

The main feedback for continuous improvement of the Energy Policy is the incorporation of important topics such as sustainable development and strategic partnerships with public and private stakeholders locally, nationally and internationally. Furthermore, this public policy is aligned with recent national and international legal commitments, which demand accountability for its compliance.

The strategies of this Policy consider the international markets of electricity and hydrocarbons, which will allow a long-term strategic planning for the effective and efficient production, commercialization and distribution of resources, with results that will improve the quality of living standards for Guatemalan people.

In this context, the Ministry of Energy and Mines presents the Energy Policy updated as a strategic and guiding tool of the actions for the electrical and hydrocarbon subsectors.

The document is divided into two major sections: a general framework and a strategic framework. The first part of the document provides information on the status of the energy sector and its corresponding subsectors; it also addresses concerns which are considered in the actions and objectives of this tool. In addition, it includes the legal and political framework, guiding principles, and approaches. Finally, it develops the theoretical and conceptual underpinning vision for the medium and long term, emphasizing the adherence of sustainable development actions.

The second part refers to the strategic framework, which contains the main points of the policy, comprising objectives, strategic priorities, goals, actions and public institutions related to the energy sector. This section reflects the interventions required for the achievement of objectives, which is the reason it is important the sustained and supported interagency coordination along with a monitoring and evaluation system.

Finally, the document refers to the process of monitoring and evaluation to measure the impacts of this policy; and so far it had not been considered as a priority in the public management of the energy sector.

Chapter 1

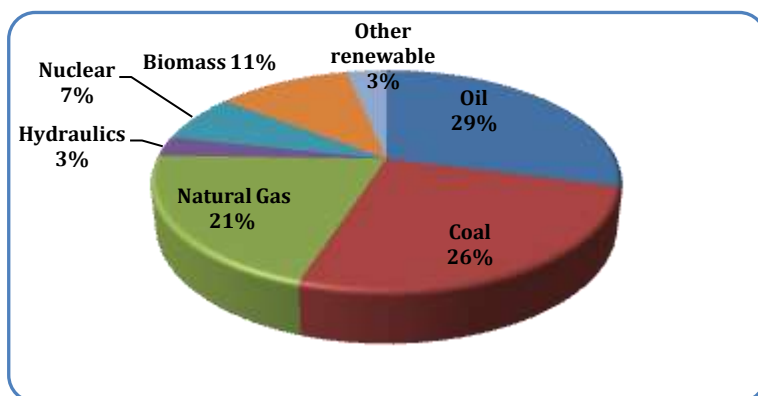
General Diagnosis of Energy Sector

International Context

Regarding to global energy demand, countries face several challenges to define an energy policy that facilitates the process towards a sustainable development. Among these challenges are the high energy prices and their volatility, climate change and environmental pollution reduction, promotion of security and energy self-sufficiency, access to investment resources, and the efficient and rational use of energy resources. The global demand for energy joins to this scenario, which according to statistics of the International Energy Agency -IEA- (U.S. Energy Information Administration), projected an increase of 32% by 2030 from 12.324 million TOE (Tonnes of Oil Equivalent) in 2012 to 16.206 million TOE in 2030 (U.S. Energy Information Administration).

By 2012, from the primary energy source, the main fuels that supplied the global consumption were oil (33%), coal (30%), and natural gas (24%). The primary renewable energy source (considering hydropower and other sources) contributed only 8%. On this basis, graph 1 illustrates how the global energy matrix might become by 2030. In accordance with these projections, the prevalence of oil reduces from 33 to 29%. In addition, other energy sources are incorporated, such as biomass with 11%, to get to have a share of renewable primary energy source of 17%. This is outstanding since it is the result of the implementation of energy policies with a sustainable development approach, by several countries which vision is to increase the use of renewable resources.

Graph 1.
Projected World Energy Demand by Source.
(Projection by 2030)



Source: U.S. Energy Information Administration

Graph 1 shows that the global tendency is to reduce the use of fossil fuels as a primary energy source. This is mainly due to international commitments from different governments to diminish the emission of greenhouse gases; thence, to address the effects of climate change, contributing to the reduction of environmental pollution.

World Fuel Prices

In 2008, world economy went through a financial crisis, which caused fuel prices raised. This meant that the most common used fuels such as oil, coal and natural gas reflected an increase in their prices, as shown in Graph 2. This is a challenge to the State of Guatemala in order to increase oil production, and to transform the sources of power generation to renewable resources, that contribute to eliminate dependence on oil and promote cleaner energy production.

Graph 2
Behavior of International Prices of Oil and Petroleum Products



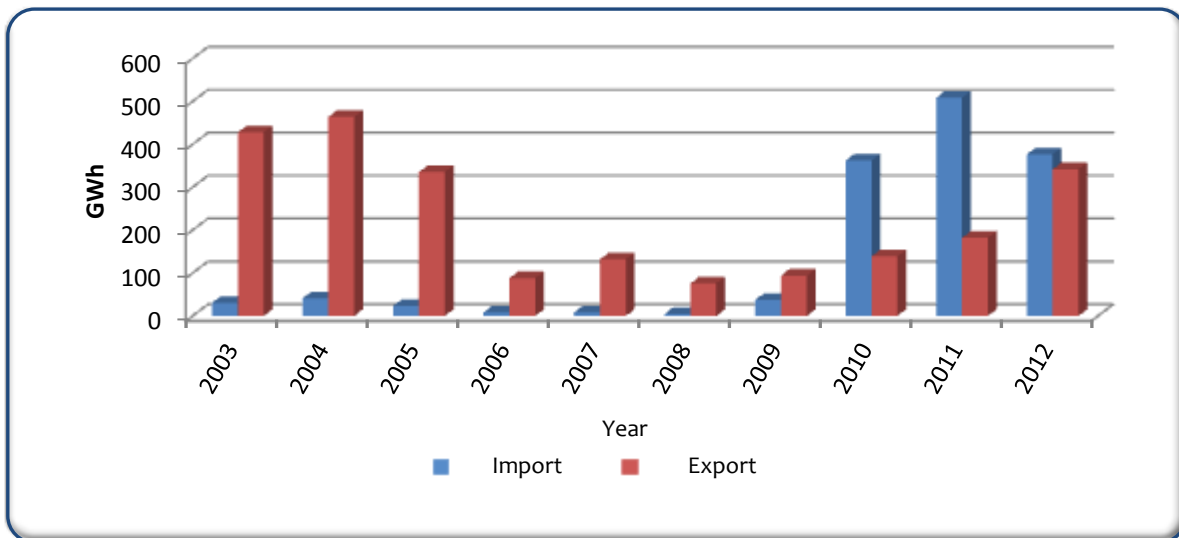
Source: General Direction of Hydrocarbons, Ministry of Energy and Mines

Regional Electricity Market

Guatemala is the country with the largest installed capacity of electric power (2,700 MW); therefore, it is also the largest exporter of electricity in Central America and Panama. In 2009, the electrical interconnection between Guatemala and Mexico began to operate officially. As a result, the country had another opportunity to import and export electrical power in order to ensure provision for electricity demand at competitive prices. Graph 3 shows the trade balance of electricity in the country from 2003 to 2012.

Graph 3

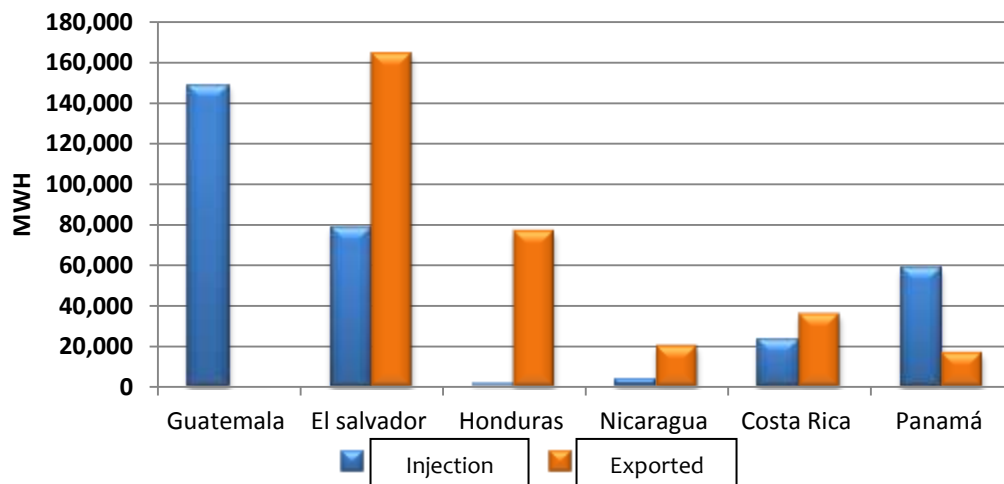
Imports and Exports of Electricity



Source: Energy Statistics. General Direction of Energy, Ministry of Energy and Mines.

The graph shows that Guatemala is an exporter country of electric energy. The chart illustrates the commercial operations performed in the Central American Regional Electricity Market.

Graph 4
Regional Transactions 2012



Source: Regional Operating Entity

With the operationalization of the Central American Regional Electricity Market, it is expected an increase of commercial transactions in order to stimulate intra-regional electricity transactions from Mexico to Panama. This will allow more options to ensure the electricity supply to all the countries of the region, as well as new opportunities for investment in power generation in the country (since Central American countries constitute a potential market for surplus electricity that might be generated).

Regional Fuel Market

Guatemala currently has a free trade market. As a result, Guatemala is the country with the lowest prices in the marketing of fuels in Central America, with the exception of Panama. This scenario reflects the free competition of multiple participants in the supply chain and the large storage capacity, enabling the country to be attractive for investment in fuel production.

Table 1
Comparison of prices in Central America, United States and Mexico
2012 Average

Unregulated Market

Product	Guatemala US\$/Gallon	El Salvador US\$/Gallon	Nicaragua US/Gallon	USA US\$/Gallon
Superior Gasoline	4.45	4.54	50.03	3.91
Regular Gasoline	4.36	4.26	4.77	3.63
Diesel	4.01	4.21	4.42	3.97
Exchange rate X 1US\$	7.84 (Quetzales)	1.00 (US Dollars)	23.57 (Cordovas)	1.00 (US Dollars)

Regulated Market

Product	Honduras US\$/Gallon	Costa Rica US\$/Gallon	Mexico US/Gallon	Belize US\$/Gallon	Panama US\$/Gallon
Superior Gasoline	4.83	5.21	3.02	6.16	4.27
Regular Gasoline	4.50	5.01	2.85	5.83	3.91
Diesel	4.22	4.61	2.96	5.29	3.76
Exchange rate x 1US\$	19.48 (Lempiras)	508.27 (Colones)	13.16 (Pesos)	1.97 (Belizean Dollars)	1.00 (Balboa)

National Context

According to the records for 2012, Guatemala has a population of over 14 million people. The country has maintained a steady population growth, with a rate of over 2%. Thus, maintaining high electricity coverage in rural areas has become one of the most important challenges for the Government of Guatemala.

Energy Potential

Since Guatemala has a wide biodiversity and availability of natural resources, it represents an opportunity for power generation. Among these resources is the hydrocarbon potential: about 65% of Guatemalan territory is composed of sedimentary rocks, indicating the probability to find oil in any part of the country. As well, due to geography and topography, the country has a water potential formed by mountain systems. This circumscribes two major hydrographic regions: rivers flowing into the Pacific Ocean and into the Atlantic Ocean. As for geothermal potential, Guatemala has 36 volcanoes which are scattered in an area of approximately 300 km. In addition, the solar potential of the country is around 200TWh. The territory has an area of 1,568 km², and the wind is classified as category 4 or higher. This implies that the country has the capacity to produce electricity of 20,000GWh per year. Finally, the sugar industry of Guatemala has grown significantly, and its share in the energy matrix exceeds 350MW by means of cogeneration of electricity.

Table 2
Potential and Use of Energy in Guatemala

Source: General Direction of Hydrocarbons. Ministry of Energy and Mines.

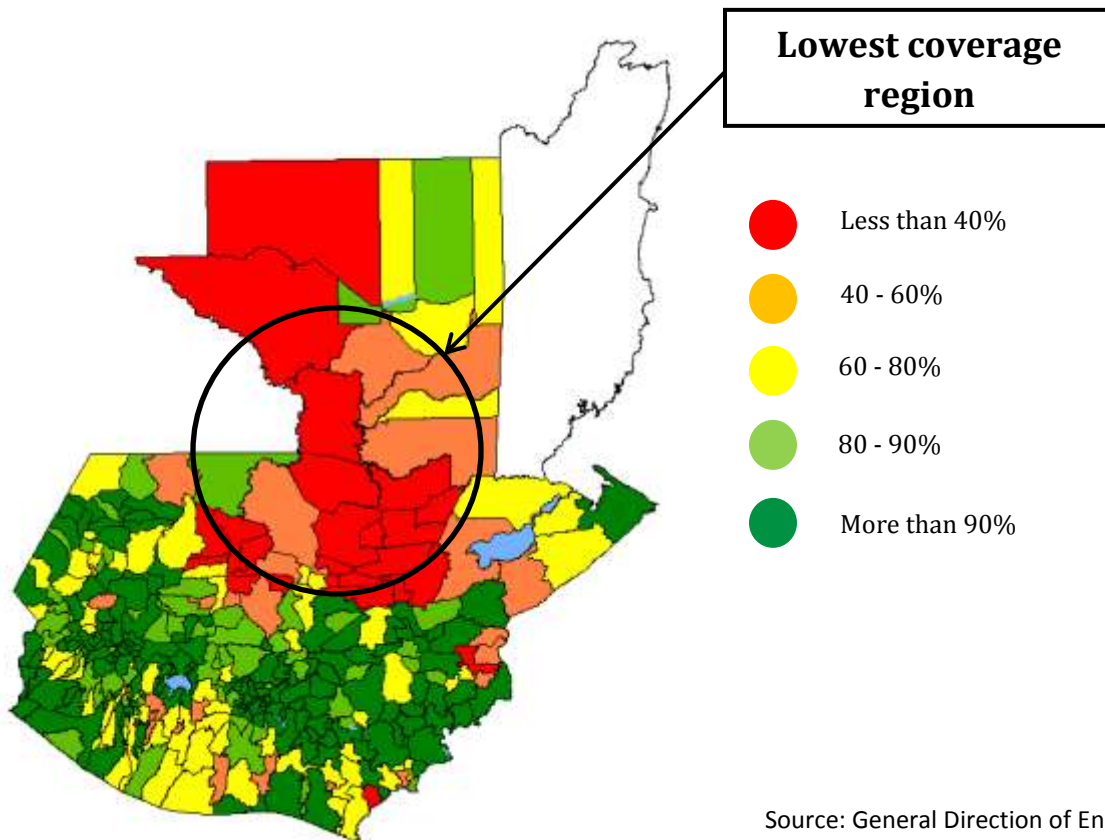
Resource	Estimated Reserves	Use
Oil	Reserve of 195,146,605 barrels	Production of 10,500 barrels/ day
Natural Gas	Unregistered	Untapped resource
Hydropower potential	6,000 MW	15%
Geothermal potential	1,000 MW	5%
Wind potential	280 MW	Untapped resource
Solar potential	5.3 kWh/m ² /day	Used in isolated systems
Biomass potential	Unregistered	306.5 MW

Access to Electricity Service

By 2012, the coverage ratio registered 85.6% of the territory. This shows that gaps still prevail between regions in electrification rate. Hence, investment in rural electrification is required. In this regard, the State of Guatemala has a challenge to face: to increase electricity coverage ratio through the entire territory.

The highest electricity rate is 97% in the department of Guatemala whereas the lowest rate is 35.4% in Alta Verapaz, as shown in the following map.

Map 1
Municipal Electricity Coverage



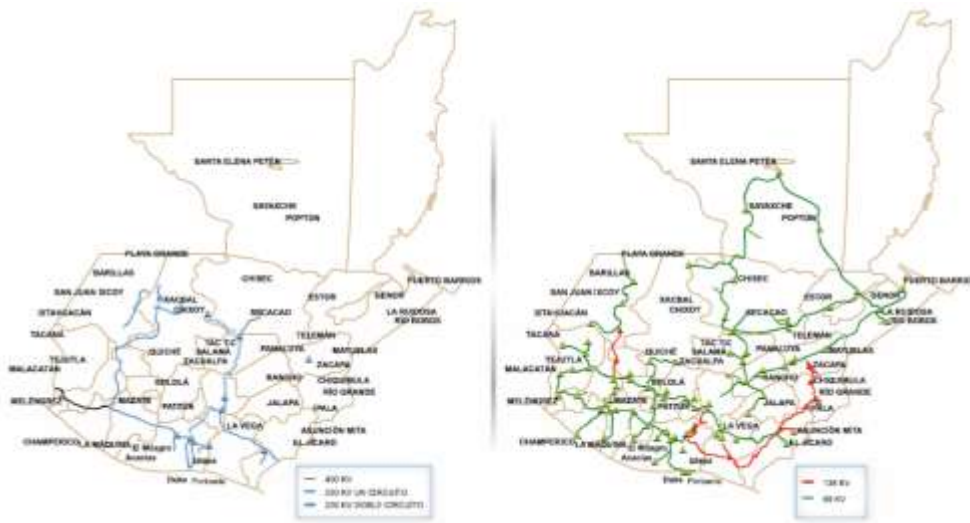
Source: General Direction of Energy.
Ministry of Energy and Mines.

Power Transmission System

With the enactment of the Electricity Law in 1996, the dynamic of electricity transmission was extended to any wholesale market agent with the purpose to build power transmission lines with the knowledge and under the regulation that it is an open and regulated service. Currently, the Ministry of Energy and Mines registers seven transportation agents duly authorized to provide the electric power transmission service. Nevertheless, some areas of the departments of the country are not yet covered by the National Interconnected System, as shown in map 2.

Map 2.

Power Transmission System (2012)



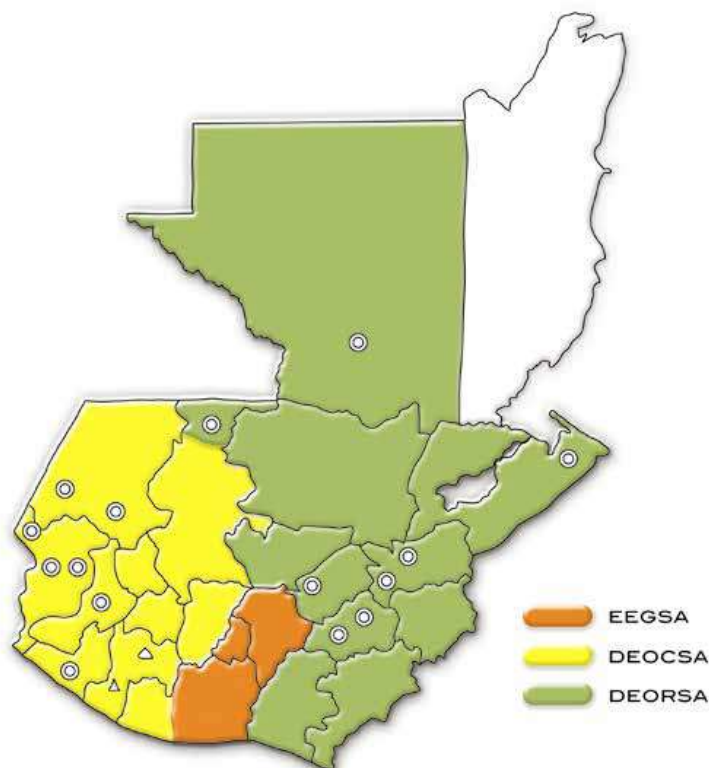
Source: General Direction of Energy. Ministry of Energy and Mines.

In 2012, about 850 km of 230KV transmission lines are being built. As a result, it is expected to transform the system from a radial topology towards a meshed system to improve its reliability.

Distribution of electricity

The distribution of electricity is a regulated activity; the National Interconnected System infrastructure consists of the distribution systems of the three major companies in the country: *Empresa Electrica de Guatemala* (EEGSA), *Distribuidora de Electricidad de Oriente S. A.* (DEORSA), and *Distribuidora de Electricidad de Occidente S. A.* (DEOCSA). It is also included 15 municipal companies. These distribution systems reach approximately 39,309 km in lines, which distribution voltages range generally from 34.5kW to 13.8kW. The three largest distributors in the country serve about 2.4 million of users in different categories; while municipal companies provide the service to 205,000 customers. Energy consumption registered by the three distributors exceeds 4,600 GWh, of which 59% corresponds to EEGSA, 23% to DEOCSA, and the remaining 18% to DEORSA.

Map 3
Distributors and Coverage Regions



National Oil Production

In 2012, about 34% of energy consumption was from petroleum products. This implies that the price of energy is influenced by external factors. This also means an external dependence for the provision of the service. The country has a diversity of natural resources for energy production, which is an advantage for electricity coverage. Nowadays, the challenge is to exploit natural resources sustainably to reduce the impacts that might be generated to the environment. For this reason, it is important that the State of Guatemala defines as an objective to execute actions towards the transformation of energy mix, ensuring the sustainability of natural resources, as well as creating the conditions to achieve the energy sovereignty in the country.

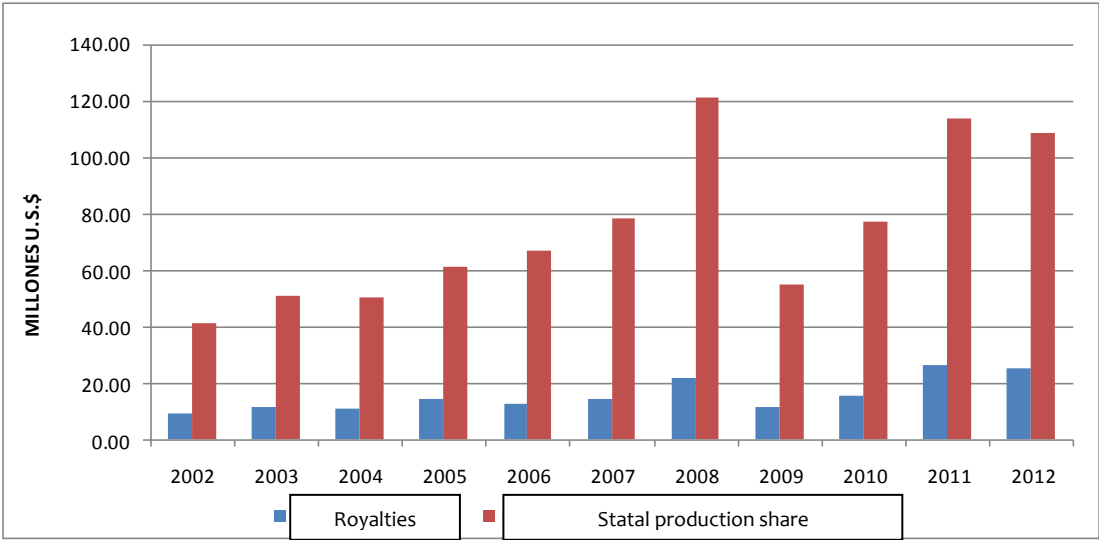
There are seven contracts in oil exploration and exploitation phase. In recent years, the oil production in the country has shown a downward trend due to the natural decline of oil fields in operation phase, which is complemented by the lack of promotion and investment for new projects in the country. As a result, production decreased from 8.5 million of barrels per year in 2003, to 4 million in 2011. For this reason, one of the challenges is to ensure the rational and efficient use of energy resources according to the capabilities and requirements of the country.

Crude is the fourth most important export product of the country, the main revenue for the State in concept of royalties. There are other incomes such as annual charges per explored or exploited hectare, revenue for Guatemalan staff training, shared income for oil pipeline transportation, fines

and other fees. In this context, it is important to stand out the first three concepts for their amounts and continuity of incomes.

Since 2002, state revenues for oil production have increased which corresponds to improved national price of oil, as shown in Graph 5. This has caused natural resources exploitation to generate an economic return for social investment in municipalities where oil is extracted, and has constituted a means to counteract social conflict. It is necessary to emphasize that oil resource exploration and exploitation should consider mitigation action plans and a responsible environmental management in order to promote sustainable development in the oil sector.

Graph 5
State Revenues for National Oil Production



Note: Data projected from national share in oil production.

Source: General Direction of Hydrocarbons. Ministry of Energy and Mines.

The Law for the Fund for National Economic Development came into force in 2008, which aims to distribute the funds raised by oil operations as follows: 20% to the Department Development Councils where petroleum operations are executed; 5% to all the Department Development Councils where there are no oil operations; and 3% to public entities responsible for the conservation of protected areas. Table 3 shows incomes from this sector.

Table 3
State revenues generated by oil national oil production

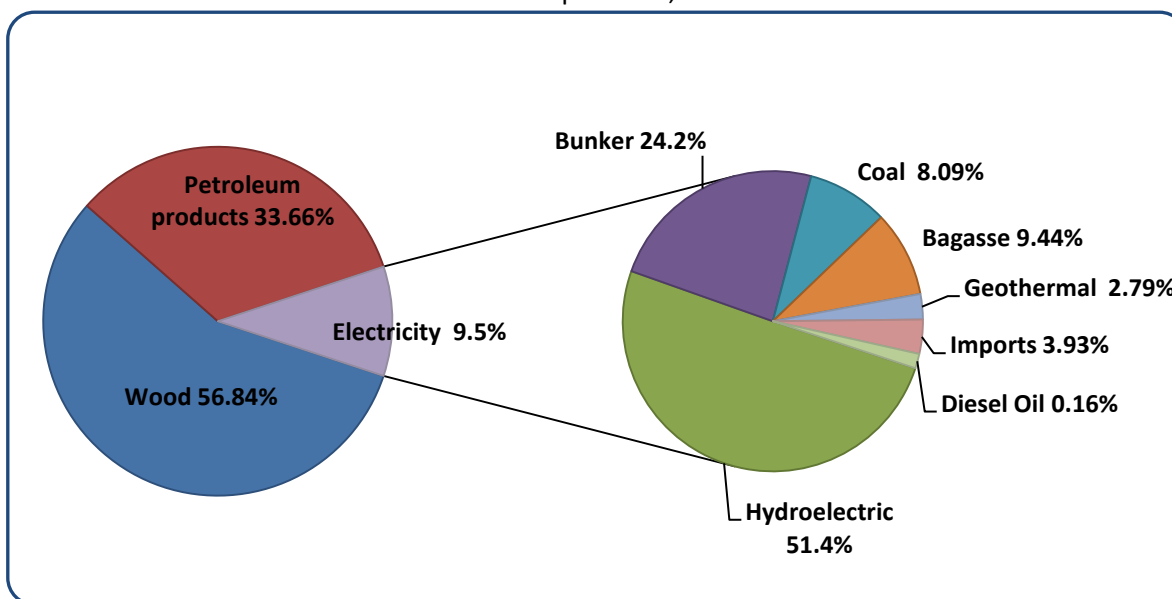
Year	Amount	Department Development Councils	Department Development Councils with oil production	Control of Protected Areas
		5.00%	20.00%	3.00%
2009	Q617,624,253.15	Q30,881,212.66	Q123,524,850.63	Q18,528,727.59
2010	Q774,970,514.28	Q38,748,525.71	Q154,994,102.86	Q23,249,115.43
2011	Q1,067,219,655.01	Q53,360,982.75	Q213,443,931.00	Q32,016,589.65
2012	Q1,081,715,215.97	Q54,085,760.80	Q216,343,043.19	Q32,451,456.48
TOTAL	Q3,541,529,638.40	Q177,076,481.92	Q708,305,927.68	Q106,245,889.15

Note: Projected data for November and December 2012
Source: General Direction of Hydrocarbons. Ministry of Energy and Mines

National Demand for Energy Resources

The energy primary source that is consumed more often is wood, mainly for cooking use in rural areas. Petroleum products are mainly exploited for heat generation for industrial and transportation sectors, as follows:

Graph 6
National energy consumption.
2012 Consumption: 67,075 KBEP

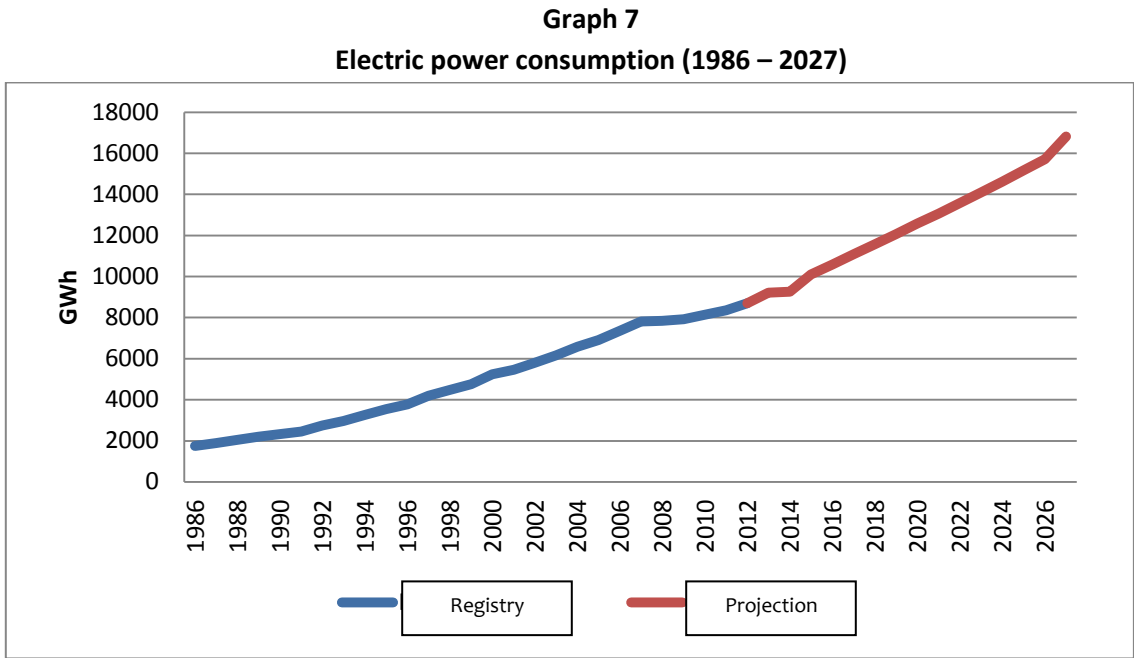


Source: General Direction of Energy. Ministry of Energy and Mines. Energy Statistics 2012.

Electricity Demand

In the last 25 years, electricity demand in Guatemala has presented a sustained average growth of 7% per year, as shown in Graph 7. From 2008 to 2012, there was a slowdown in demand due directly to the global economic crisis that hit domestic economy. In 2012 energy consumption increased 350GWh in comparison to 2011.

At present, the electric power demand reported figures close to 1,500 MW, while the Guatemalan generating capacity is around 2,700 MW, which implies an oversupply, mainly focused on thermal generation.



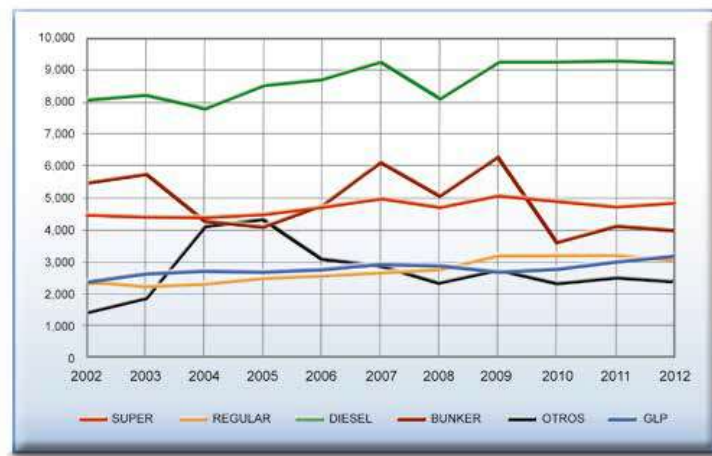
Source: General Direction of Energy. Ministry of Energy and Mines. Energy Statistics 2012.

Based on the assumption that from 2012 to 2027, electricity demand will maintain an average growth of 7% per year, the National Electric Energy Commission, projected a demand of 16,800 GWh by 2027. Considering foregoing tendencies, and with a high load factor, it requires a power installed capacity of approximately 3,000 MW in order to meet electricity demand by 2027.

Petroleum

In the last ten years, the consumption of oil and petroleum products has shown an annual average growth of 1.38%. Nevertheless, as seen in the graph below, there are external factors influencing their consumption by external factors such as international price of oil, worldwide context of economy and energy power produced by petroleum products (thermoelectric).

Graph 8
Oil and Petroleum Products Consumption
(2002 – 2027)



Note: projected data for December 2012.

Source: General Direction of Hydrocarbons. Ministry of Energy and Mines.

The graph shows the breakdown of petroleum products consumption during the same period, and it may be observed the way that 2008 economic crisis affected it. Except for regular gasoline, all other products showed a decline in consumption. This was reversed in 2009 with economy recovery. By 2010, bunker showed an important downfall compared to 2009, which went from 3.035 to only 1.892GWh. This is the result of energy mix transformation that involves actions to ensure sustainable and efficient use of resources. The country has already taken the first steps.

Wood Consumption

Wood is the energy resource most used in the country. By 2012, its consumption was of 57% of the total energy exploitation. Its increased use and consumption is in non-electrified areas and in the poorest households for cooking use, mainly. There is a lack of control for smoke generation (CO₂), and wood is often burnt in closed areas; hence, there is a risk for health to cause respiratory illnesses. Another negative effect is deforestation since there is no enough forest management plans.

Map 3
Wood Consumption by Municipality



Source: General Direction of Energy. Ministry of Energy and Mines.

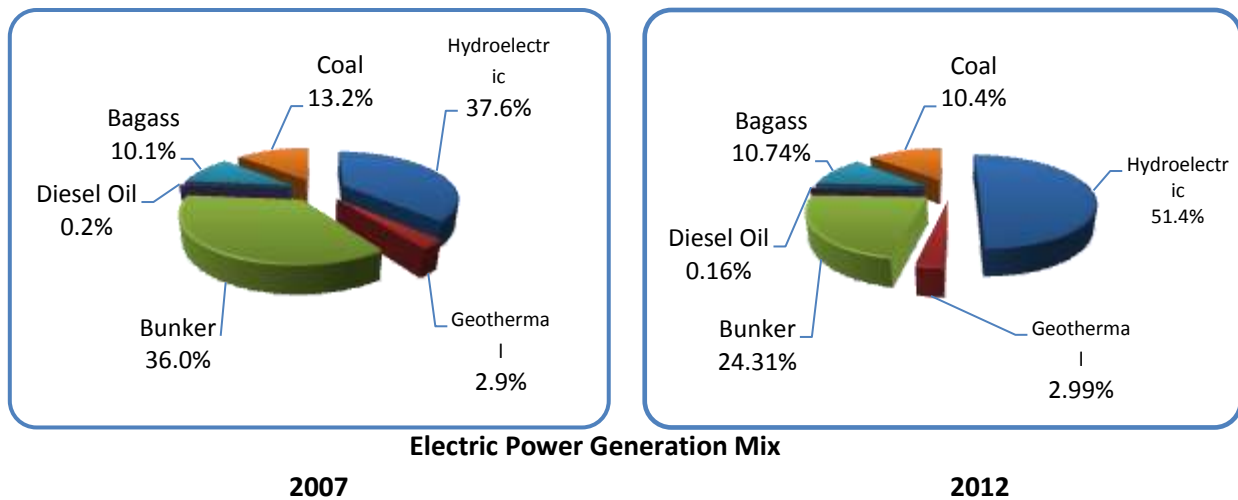
It is estimated that 16 million cubic meters of wood are annually consumed in Guatemala. Households cooking with wood (60 to 70%) lack of a suitable fireplace for smoke extraction. On the other hand, between 5% and 20% of families in extreme poverty cooked in the same room where they slept. Moreover, according to ECLAC (Economic Comission for Latin America and Caribbean), 72% of Guatemalan households used wood as an energy source for cooking, which represents a concern for the damage to health caused by smoke burning.

National Energy Resources Supply

Electric Power Generation

It may be observed that from 2007 to 2011, the annual electricity generation (GWh) by renewable sources increased from 50.6% to 65.1%. However, in both cases, generation by bunker or fuel oil has a very important value, and it directly impacts on marginal costs of opportunity market.

Graph 9



Source: General Direction of Energy. Ministry of Energy and Mines. Energy Statistics 2012.

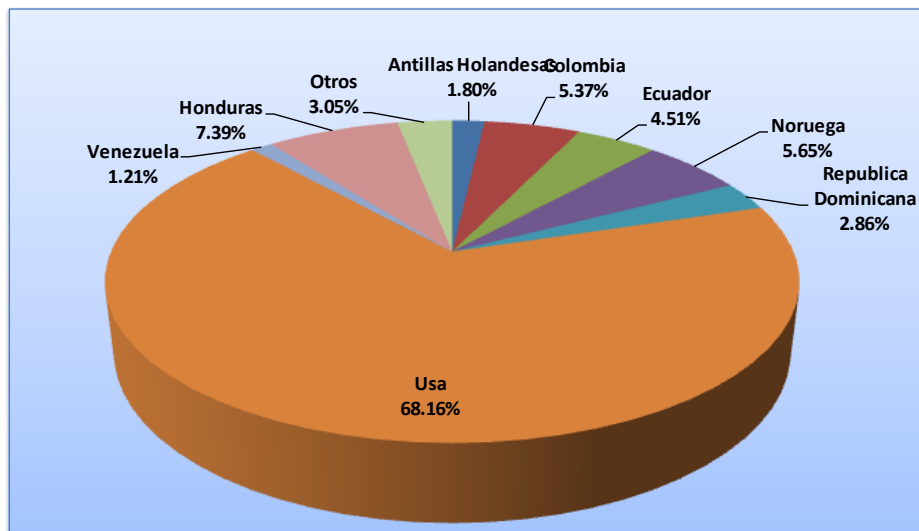
It is noteworthy that although the energy matrix does not present power generation by natural gas, it could be an alternative in the future, due to the terms of cost and price stability projected in a medium and long term.

Oil Products Supply

From 2002 to 2012, imports of major petroleum products showed the same tendency as demand did in the same period of time. This implies that importing companies manage a product inventory policy to meet demand, since during these years there was neither a shortage of any petroleum products nor an oversupply. This is with the purpose to avoid risks caused by oil price volatility in the long term.

As a result to perform in a free market for the purchase and commercialization of petroleum products, they were imported by international participants involved in the supply chain in the existing legal framework. Thus, dependence on a country for supply was avoided, as well as it was guaranteed a higher competitiveness. Graph 10 illustrates Guatemala's importing countries in 2012.

Graph 10.
Petroleum Products Importing Countries (2012)



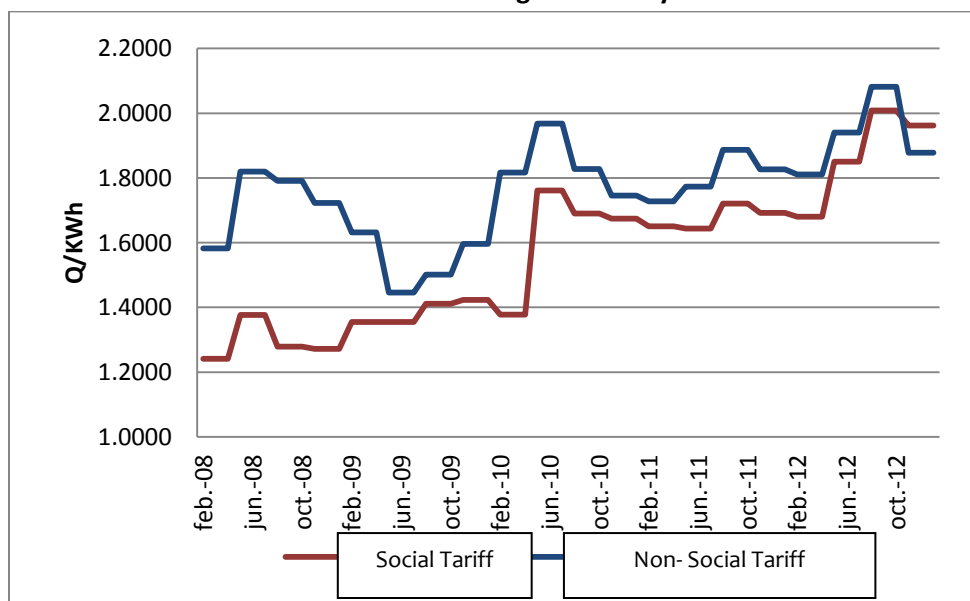
Source: General Direction of Hydrocarbons. Ministry of Energy and Mines.

Access to Energy Services Rates

Electric Tariffs

Electricity tariffs in Guatemala are determined by voltage and consumption. Nonetheless, Graph 11 shows rates at low voltage: social and nonsocial fees.

Graph 11
Behavior of Low Voltage Electricity Rates



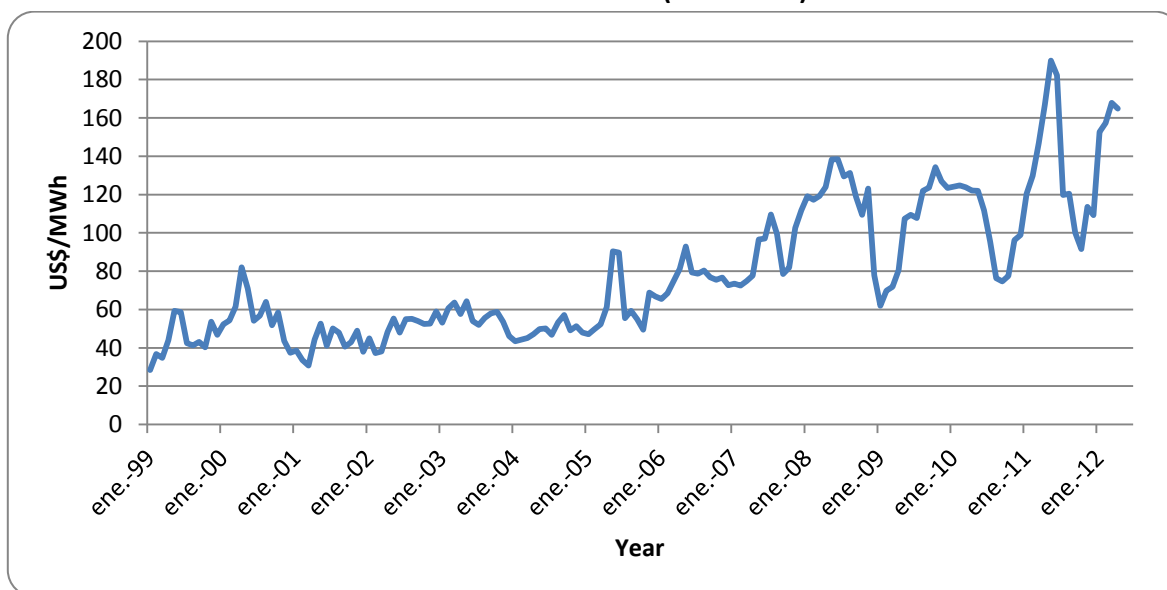
Source: General Direction of Energy. Ministry of Energy and Mines. Energy Statistics 2012.

In recent years, electricity price dynamic has reported an annual growth rate of about 1%. This depends heavily on the costs related to the energy matrix. For this reason, during dry climate season, the price depends on bunker prices; whereas in rainy season they might be decreased by rainfall effects to improve hydroelectric production. However, it should be noted that, since energy matrix still depends on bunker, rates reflect their costs.

SPOT Price of Electricity

This is the value of short-term marginal cost each hour. It is defined as the cost incurred by electricity system to supply an additional kilowatt-hour (KWh) at a specific power demand, considering capacity production and effective transmission. Short term marginal cost is the maximum variable cost of generating units in the reference node, called by the Economic Dispatch, and operating in the variable cost function according to the result of the daily program, attending the ancillary services requirements. The following chart shows the behavior of SPOT price from 1999 to 2012.

Graph 12
Behavior of SPOT Price (1999-2012)



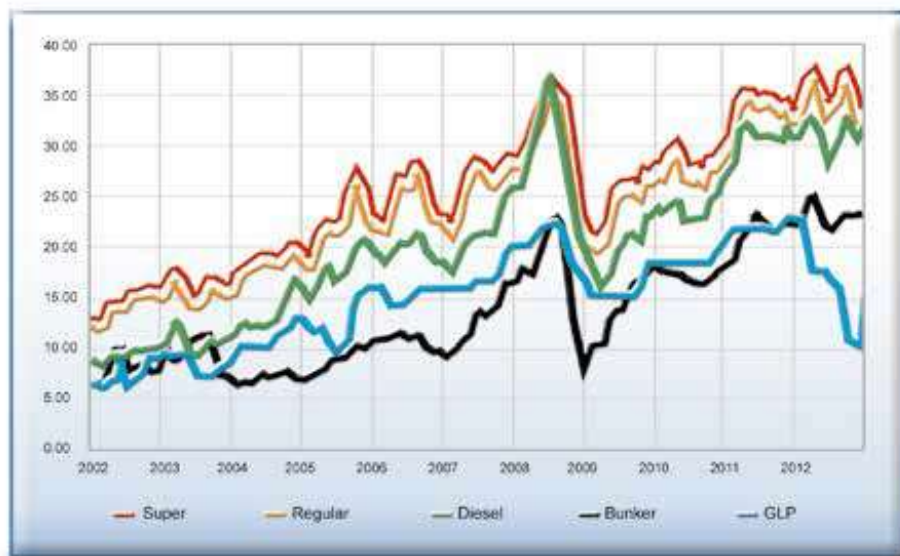
Source: General Direction of Energy. Ministry of Energy and Mines. Energy Statistics 2012.

The composition of the install capacity in the country, which 30% depends on petroleum products, has caused that SPOT price behavior is similar to international oil prices behavior also.

Petroleum Products Prices

Oil prices traded in the country, determined by a free market system, are contained in the Law of Hydrocarbon Commercialization. These should reflect the conditions of international and domestic market, which will influence to determinate prices of energy by fuel.

Graph 13
Behavior of Fuels Price
(2002-2012)



Source: General Direction of Hydrocarbons. Ministry of Energy and Mines.

In 2010, the maximum price of gasoline was Q30.16 per gallon; regular gasoline, Q28.89; and diesel, Q27.28. By 2011, the upward trend in fuel prices was even more pronounced than the regular peaks of the year. As a result superior gasoline priced Q36.05 per gallon; regular gasoline, Q35.52; and diesel, Q32.70.

In 2012, the behavior of fuel prices in the domestic market was atypical: two strong increases during April and September. The maximum prices of 2012 presented in September, when gasoline registered a peak of Q37.5r per gallon; regular gasoline, Q36.75; and diesel, Q33.29.

As for liquefied petroleum gas (propane/butane), Guatemalan market has been characterized by stability in prices during 2010 and 2011. On the other hand, in 2012 there was a strong competition among participant companies in the domestic market; as a result, at the end of the year, the 25 pound cylinder was priced at Q63.33. In December, a sharp increase registered in prices: 25 pound cylinder rose to Q90.00.

Legal and Policy Framework

International Conventions

Energy Policy is aligned with a number of international conventions related to the energy sector, environmental regulations, and protection of social and economic rights, which the State of Guatemala has ratified. Thus, these instruments create the international policy framework that contributes to identify and guide the implementation of the strategic actions of this Policy.

This set of tools constitute the framework that guides national legislation in order to establish a comprehensive harmonization to enforce the Rule of Law as well as to establish rights and obligations concerning to the energy sector.

Internationally, the State of Guatemala has signed the following legal instruments:

- ✓ Universal Declaration of Human Rights
- ✓ Declaration on Economic, Social and Cultural Rights
- ✓ Stockholm Declaration
- ✓ World Commission on Environment and Development (Brundtland Report).
- ✓ Convention 169 on Indigenous and Tribal People
- ✓ Earth Summit, Rio de Janeiro. United Nations Conference on Environment and Development.
- ✓ Kyoto Protocol
- ✓ United Nations Global Compact
- ✓ Millennium Development Goals. Millennium Summit.
- ✓ Johannesburg Declaration on Sustainable Development. World Summit on Sustainable Development.
- ✓ Rio+20 Declaration. United Nations Conference on Sustainable Development.
- ✓ Extractive Industries Transparency Initiative (EITI).

The following regional legal instruments are also noteworthy for energy sector compliance:

- ✓ The Framework Treaty of Central American Electricity Market
- ✓ The Central American Customs Union

National legal and policy framework

The Energy Policy 2013-2027 is constituted by a legal reference based on the Constitution of the Republic, which provides that “the State is obliged to promote social, economic and technological development to prevent pollution of environment and maintain the ecological balance”. It orders to “take the necessary steps for conservation, development and exploitation of natural resources efficiently”. It states “the technical and rational exploitation of hydrocarbons, minerals and other non-renewable resources as a public utility and necessity, indicating that conditions will be promoted for their exploration, exploitation and commercialization”. Finally, the Constitution declares “the electrification of the country as a national emergency. The State shall adopt the necessary steps for conservation, development and use of natural resources efficiently, and to

foster the suitable conditions to promote foreign and national capital investment”. (Articles 97, 119, 121 and 121 of the Constitution of the Republic of Guatemala).

Moreover, the Law of the Executive Branch (Article 34) stipulates that the Ministry of Energy and Mines is responsible for the study and promotion of the use of new and renewable energy sources, as well as to foster the rational exploitation and to urge for the energy development in its various forms and types, in order to provide a national policy to achieve the energy independence of the country. This legal framework defined to the Ministry of the Energy and Mines as the ruling entity of the sector, and the responsible for the formulation and implementation of policies in the energy sector.

In addition, the Energy Policy 2013-2027 is based in the following laws and decrees:

- ✓ Law of Hydrocarbons (Decree 109-86)
- ✓ Law of Protected Areas (Decree 9-89 of the Congress of the Republic of Guatemala).
- ✓ Law of Electricity (Decree 93-96) and the corresponding regulations
- ✓ Law of Hydrocarbon Commercialization (Decree 109-97) and the corresponding regulations
- ✓ Law of Urban and Rural Development Councils (Decree 11-2002)
- ✓ Municipal Code (Decree 12-2002)
- ✓ General Law of Decentralization (Decree 14-2002)
- ✓ Law for the Fund for National Economic Development (Decree 71-2008)
- ✓ Regulation of Environmental Impact Studies

For the hydrocarbon subsector, the Law of Hydrocarbons defined the General Direction of Hydrocarbons of the Ministry of Energy and Mines as the regulator of the subsector. In this context, the Ministry of Energy and Mines is ordered to ensure the efficiency and security of petroleum product provision in order to increase the energy supply of the country.

The Law of Electricity provides the establishment of a regulator agent for the electricity subsector: the National Electrical Energy Commission, which is defined as a technical body of the Ministry with functions of ensuring compliance of obligations of bidders and dealers, as well as protecting the rights of users, and in defining transmission and distribution tariffs. Moreover, this Law stated that the administration of the wholesale market shall be in charge of a non-profitable private entity, which was named Wholesale Market Administrator.

It is noteworthy to mention that the following national legal instruments are important in order to enhance the promotion of social dialogue processes in the energy sector: Law of Decentralization (Decree 14-2002), Law of Urban and Rural Development Councils (Decree 11-2002), and Municipal Code (Decree 12-2002).

Since the country possesses a wealth of natural resources, Guatemala has a System of Protected Areas, aimed at the rehabilitation and protection of biodiversity and natural resources. This system was constituted by the Law of Protected Areas (Decree 9-89 of the Congress of the

Republic of Guatemala). This legal and institutional framework is important for the implementation of energy projects, since its compliance is necessary to promote an appropriate environmental management, especially with the construction and operation of hydropower plants to foster a responsible management of water.

The Regulation of Environmental Impact Studies was enacted in order to strengthen environmental controls. This stipulates that environmental impact studies shall be elaborated prior to the implementation of a project, construction, industry or activity. It was released with the purpose to predict the environmental impacts that may result from the implementation of projects as a means to propose actions to prevent control or correct their effects. The Regulation also contains guidelines, structure and the necessary proceedings to evaluate, control and monitor environment of diverse projects. These outlines lead the implementation and alignment of these actions with the environmental and natural resources protection to promote sustainable development in the country.

In order to accomplish the objectives and goals set forth in this document, it is necessary to coordinate and link with other public policy actions. These are listed below:

1. National Policy for Development of Small and Medium Enterprises
2. Policy of Integral Rural Development
3. National Policy for Cleaner Production
4. National Water Policy
5. National Forest Policy
6. Policy for Environmental Management
7. Decentralization Policy

Furthermore, the benefits resulting from the implementation of energy projects (generation and supply of electricity) contribute to the development of the population and fight against poverty. These outcomes are related with other public policies such as:

1. Policy for Social Development and Population (2002)
2. Policy of Food and Nutritional Security (2005)
3. Policy for Promotion and Integral Development of Women (2008-2023)
4. Public Policy for the Protection of Children and Adolescents
5. National Youth Policy (2012-2020).
6. National Employment Policy “Generation of safe, decent and quality employment” (2012–2021).

Scope of the Energy Policy 2013-2027

The implementation of the Energy Policy 2013-2027 is framed within a sustainable development approach, and towards equitable social development. Consequently, the targets of the defined objectives are aimed at all the sectors of Guatemalan population.

Approaches and principles of the Energy Policy 2013-2027

This policy is based on a number of approaches that lead its implementation:

- ✓ **Managing by results:** to achieve consistency and coherence between objectives and defined targets, so that they may be materialized in goods and/or services to generate positive and sustainable impacts in benefit of population in the long term.
- ✓ **Territorial Approach:** to identify local needs and potentials to enable each strategy proposed in the operational plan of the Energy Policy.
- ✓ **Competitiveness Approach:** to position Guatemala as one of the best countries to invest, create jobs and do business in Mesoamerica. This is with the purpose to set the basis for sustained economic and social development, contributing to raise Guatemalans incomes, and consequently achieving better living standards.
- ✓ **Decentralization and Alliances to Development:** To promote quality services and speed up the competitiveness of the country. In order to achieve this, it is necessary to establish alliances with strategic stakeholders to urge for dialogue to facilitate the implementation of energy projects.
- ✓ **Social-environmental sustainability:** to set the basis for sustainable development. It is important to align three elemental factors: economic growth, social development and a proper management of natural resources. This is with the purpose to improve living conditions for Guatemalan natural and social capital.
- ✓ **Enhancement of Infrastructure Investment:** to provide material conditions to stimulate investment and implementation of energy projects.
- ✓ **Integrated Rural Development:** to identify and prioritize areas to provide electrical power service, and to foster opportunities for hydrocarbon projects. Energy is a source that contributes to fight against poverty rates and in turn promotes better living conditions for the development of rural population. Furthermore, the implementation of energy projects provides employments and training process in benefit of local people.
- ✓ **Support investment in local projects (municipal and community):** to promote hydrocarbon projects as well as to generate and distribute electricity in order to reduce costs and improve the service.

Since Energy Policy 2013-2027 aims to improve living standards for rural and urban population, to transform energy mix and to foster energy sovereignty, it will be governed by the following principles:

- ✓ **Universality of energy:**

The State shall ensure that all Guatemalan people have access and may use energy since it is stated as a public utility.

- ✓ **Security of supply:**

The Energy Policy leads to ensure a continuous, safe and quality power energy supply.

- ✓ **Efficiency and Competitiveness:**

The Energy Policy urges for the use of renewable resources to make the energy sector an attractive area for investment and a competitive economic industry.

✓ **Sustainable Development:**

All actions to be promoted through this policy focus on economic growth and social welfare of society, urging for a responsible and appropriate use of natural resources.

✓ **Rational and Efficient Use of Energy:**

It will ensure the rational and efficient use of energy and national energy sources.

✓ **Harmonious approach with environment:**

It addresses the execution of actions contributing to reduce vulnerability to climate change, and a proper management of natural resources in coordination with strategic stakeholders. The responsible management of natural resources is not defined as an obstacle for the development of the country, but an essential strategy for a sustainable development.

✓ **Long-term vision:**

The Energy Policy is based in a long-term framework, which requires a commitment beyond a four-year government period in order to enhance Guatemala as an energy platform in Mesoamerica.

✓ **Comprehensiveness:**

The implementation of this Policy shall not be considered as single action; hence, the strategic guidelines and actions shall be executed comprehensively, in coordination with other public policies, as well as with aligned interagency, intersectoral and multidisciplinary actions.

✓ **Continuity:**

The execution of this policy shall urge for continuous social dialogue at different levels, enabling the incorporation of public and private stakeholders as well as civil society, as this will strengthen the institutional mechanisms and ensure the continuity of the policy, accomplishing targets in the medium and long term. Finally, in the future a wide and dynamic dialogue process shall be constituted in order to analyze and readjust strategies for the effectiveness of this public policy.

Sustainable Development: An approach of the Energy Policy 2013-2027

Since the State of Guatemala has ratified a number of international commitments, the Energy Policy 2013-2027 considers as priority a sustainable development approach, understood as the process of sustained and equitable improvement in living standards for Guatemalan people, based on appropriate conservation and protection actions for environment, without compromising the expectations of future generations. Therefore, it has taken as a reference the Brundtland Report of United Nations as well as conceptual contributions from academia on this subject. Furthermore, sustainable development addresses three pillars: effective economic growth, equitable social development and a responsible management of environment.

Therefore, sustainable development is highlighted as a transversal approach in this policy, which shall be in every action, so that its evaluation demonstrates positive and beneficial impacts to all the sectors of the Guatemalan population.

Chapter II: Strategic Framework

Strategic Framework

General Objective of the Energy Policy 2013-2027

To contribute to the sustainable energy development of the country, with social equity and a proper management of environment.

Axis of the Energy Policy 2013-2027

In order to meet the general objective of this Policy, five areas of intervention have been analyzed and identified, which will guide the actions of the Ministry of Energy and Mines and other related stockholders related to the sector. The intervention actions are listed as follows:

1. Security of electricity supply at competitive prices.
2. Security of fuel supply at competitive prices.
3. Exploration and exploitation of oil reserves aimed at national self-provision.
4. Efficient use and save of energy
5. Reduction of the use of wood in the country

Axis of Energy Policy 2013-2027

Axis No. 1. Security of electricity supply at competitive prices

Operative Objectives	Long – term goals	Actions	Stakeholders
To diversify electricity power generation (matrix) prioritizing renewable resources.	80% of electricity is produced by means of renewable resources.	<ul style="list-style-type: none"> • To update studies about renewable resource potential of the country. • To promote hydropower, geothermal, solar, wind, biomass energy as well as other new and renewable energy sources. • To promote technological innovation and technological development of human capital in the energy sector. 	MEM, CNEE, INDE, MARN. Organized private sector.
<p>To expand the system of generation and transmission of electricity.</p> <p>To promote investment in production of 500 MW of renewable energy.</p>	<p>500 MW of renewable energy is generated by investment promotion.</p> <p>Promote investments in transmission lines of different voltage levels, increasing the network in 1,500 km, in order to facilitate to supply the demand and the rational exploitation of natural resources</p>	<ul style="list-style-type: none"> • Continually to develop indicative expansion plans of generation and transmission energy systems. • To strengthen the Ministry of Energy and Mines in the efficient development of energy planning by means of training professional staff and technological equipment. • To elaborate master plans of energy potential in renewable energy of the country. • To perform bidding process to implement expansion projects of electricity transmission system. 	MEM, AMM, CNEE, INDE. Organized private sector.
To expand national electricity coverage.	95% electricity coverage rate is achieved.	<ul style="list-style-type: none"> • To coordinate the implementation of a strategic plan for rural electrification aligned with the actions performed by INDE. • To enhance the actions of the Rural 	MEM, INDE, CNEE, AMM, Distributors and municipal electric companies.

		<p>Electrification Plan of INDE.</p> <ul style="list-style-type: none"> • To develop rural electrification programs using supply options to isolated systems prioritizing renewable energy sources. • To improve interagency proceedings associated with rural electrification requirements. 	Organized private sector.
To position the country as the leader of the Regional Electricity Market and other interconnected countries.	<p>Guatemala should be transformed into the regional plant that could exports at least 300MW to the region.</p> <p>At least 200MW are imported at competitive prices, and at least 150MW of excess capacity are exported, using Mexico's Interconnection.</p>	<ul style="list-style-type: none"> • To increase electricity export to the Regional Electric Market in order to facilitate transactions, not including additional charges for the country, to reach competitive prices that allow the sale of surplus thermal generation. • To regulate renewable energy export in order to ensure that benefits of clean energy come first to local users and consumers. • To formulate a methodology to define the country's strategic renewable resource energy reserve. • To harmonize national legislation with regional legislation to strengthen the participation of the country in the Regional Electric Market (MER). • To harmonize national legislation with Mexican regulations to facilitate commercial transactions of import and export of electricity. • To create mechanisms to facilitate electricity import (under supply contracts in percentages to improve final prices) without discouraging investment in generation. 	<p>MEM, AMM, CNEE, CRIE, EOR, CDMER, INDE.</p> <p>Organized private sector.</p>

<p>To contribute to sustainable development of the communities where energy projects are executed.</p>	<p>To achieve that the 100% of energy projects address sustainable development principles.</p>	<ul style="list-style-type: none"> • To institutionalize opportunities for participation and dialogue between different stakeholders to promote social approach in energy projects. • To develop basic technical studies to assess economic, social and environmental impacts by energy projects implementation. • To promote a new law to allow targeting revenues from electricity subsector activities for the benefit of influenced areas of the renewable Projects, and to present the draft the law to the Congress. • To promote corporate social responsibility as a means to enhance sustainable development at local and central scope by authorization contracts of public property use. 	<p>MEM, municipalities, Development Councils, SNDP, MARN, Congress of the Republic of Guatemala, INDE. Organized private sector.</p>
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Axis No. 2. Security of fuel supply at competitive prices.

Operative Objectives	Long – term goals	Actions	Stakeholders
To bring alternative fuels into the commercialization chain.	<p>An inventory of potential of probable reserves of natural gas in the country is elaborated.</p> <p>At least one terminal storage of natural gas is settled.</p> <p>Laws and regulations governing the exploitation, use and commercialization of natural gas and biofuels are adopted.</p>	<ul style="list-style-type: none"> • To develop a plan to stimulate exploitation and import of natural gas. • To submit a bill and regulations for the use and commercialization of natural gas. • To submit a bill and regulations for the use and commercialization of biofuels. 	MEM, Congress of the Republic, General Secretariat of Presidency. Organized private sector.
To enhance the control and supervision of stakeholders in the commercialization chain of natural gas and biofuels.	<p>Six regional offices for price control and quality fuel are implemented.</p> <p>70% staff training is increased.</p> <p>Six mobile laboratories for quality and quantity fuel verification are improved.</p> <p>A digital platform is created.</p>	<ul style="list-style-type: none"> • To decentralize administrative processes in all territory. • To develop a professional program for staff of the Ministry of Energy and Mines. • To implement equipment and technology for control and monitoring for fuel quantity and quality. • To design a digital platform for the management and dissemination of information on fuel commercialization subject. 	MEM, DIACO, MINECO. Organized private sector.
To improve competitiveness in fuel market.	<p>A single-window for administrative streamlining is created.</p>	<ul style="list-style-type: none"> • To upgrade administrative procedures in the supply chain. • To formulate technical standards in order to facilitate investment in the supply chain to 	MEM, COGUANOR. Organized private sector.

	<p>Requirements to facilitate procedures in the Ministry of Energy and Mines are standardize.</p> <p>A technical standard for commercialization chain activities is implemented.</p>	<p>promote economic development for the country.</p>	
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Axis No. 3. Exploration and exploitation of oil reserves aimed at national self-provision.

Operative Objectives	Long – term goals	Actions	Stakeholders
To increase the opportunity for exploration and exploitation of the reserves in order to increase oil and natural gas production.	100% of oil production is increased. 25% of natural gas reserves is exploited.	<ul style="list-style-type: none"> • To improve bidding call procedures for new areas of oil exploration and exploitation. • To submit a bill and model contracts for natural gas exploration and exploitation. • To enhance monitoring and enforcement of existing contracts for exploration and exploitation of oil and natural gas. • To conduct technical studies to implement a system of monitoring and enforcement for exploration and exploitation of oil and natural gas. • To develop audits on compliance with annual planning of each contract for exploration and exploitation of oil and natural gas. 	MEM, Congress of the Republic, General Secretariat of the Presidency, MARN. Organized private sector.
To modernize technology platform for the production and transportation of oil and natural gas under a sustainable development	10% of infrastructure for production and transportation of oil and natural gas is increased.	<ul style="list-style-type: none"> • To submit technical studies for infrastructure modernization of oil and natural gas. • To create a drill core laboratory. • To create the fourth control of oil fields. • To establish the Institute of Petroleum 	MEM, IGN, USAC, Congress of the Republic. Organized private sector.

approach.		<p>and Natural Gas.</p> <ul style="list-style-type: none"> • To propose and manage the approval of the law for the creation of Institute of Petroleum and Natural Gas. 	
To stimulate national oil refining.	10% of domestic crude oil production is refined.	<ul style="list-style-type: none"> • To formulate technical feasibility studies to establish processes of domestic crude oil refining. • To establish public-private partnerships for the domestic crude production and refining • To develop specialized technical careers in oil and natural gas. 	MEM, CONADIE, USAC. Organized private sector.
To improve transparency mechanisms and orientation of public expenditure from oil extraction royalties.	Local governments report 100% of funds investment from oil extraction royalties.	<ul style="list-style-type: none"> • To enhance local skills for social investment of oil extraction royalties aligned to priorities emerging from municipal development planning. • To enhance management capacity of municipalities and Development Councils in transparency and accountability subjects. 	MEM, MINFIN, SCEP, PDH, COPRET, local governments, CONAP. Organized private sector.

Axis No. 4. 4. Efficient use and save of energy

Operative Objectives	Long – term goals	Actions	Stakeholders
<p>To create mechanisms for the efficient and productive use of energy.</p> <p>To ensure that 30% of public agencies use energy efficiently.</p>	<p>To support the industry and commerce sector to obtain a real reduction in the energy of 25%.</p>	<ul style="list-style-type: none"> • To institutionalize energy efficiency in public agencies. • To present in the Natioal Congress and manage the law of rational and efficient use of energy. • To create a national fund for the conservation and efficient use of energy. • To promote good practice in the use of energy. • To implement technologies for efficient use of energy. 	<p>MEM, MARN, Congress of the Republic, General Secretariat of Presidency, central and local public institutions. Organized private sector.</p>

Axis No. 5. Reduction of the use of Wood in the country

Operative Objectives	Long – term goals	Actions	Stakeholders
To increase the use of wood-saving stoves.	To build and commissioning 100,000 wood-saving stoves, and to teach the appropriate efficient use of those.	<ul style="list-style-type: none"> • To create the regulation for the use and certification of Wood-saving stoves. • To support microcredit programs for purchasing wood-saving stoves. • To provide technical assistance for the use of wood-saving stoves. • To coordinate the development and implementation of a national plan for the use of efficient wood-burning stoves to reduce pollution and improve human health. 	MEM, MSPAS, INAB, MIDES, MINECO, municipalities, basin authorities. Organized private sector.
To reduce the use of Wood in industries.	To reduce in 15% of Wood consumption in industrial activities.	<ul style="list-style-type: none"> • To develop technical studies to characterize the demand of wood for industrial use. • To regulate the use of wood in industrial activities. • To provide technical assistance for the management of energy forests. 	MARN, MEM, INAB. Organized private sector.
To promote the use of energy plantations and energy forests for	To promote increase in 10% from energy forests.	<ul style="list-style-type: none"> • To implement a strategy for energy forest implementation in Wood supply, based on feasibility studies. • To promote the creation of an incentive fund for energy plantations for industrial use. • To enhance interagency mechanism 	INAB, MEM, MAGA. Organized private sector.

industrial sector use.		coordination.	
To substitute the use of Wood for energy sources in homes.	The 25% of wood use will be substituted by another energy source in homes.	<ul style="list-style-type: none"> • To implement awareness campaigns and information on the rational use of Wood. • To promote the use of alternative and more-efficient energy sources to substitute wood consumption. • To promote the use of alternative sources (LPG, methane, etc.) to substitute wood. 	MEM, MINEDUC, INAB, MSPAS. Organized private sector.

Main strategies for the implementation of Energy Policy 2013-2027

Plan of Action

The Plan of Action is a management tool for guiding and monitoring the necessary actions for the fulfillment of the objective of the Energy Policy 2013-2027. This tool covers the period 2013 – 2027 and defines the strategic framework, based on a management by results approach, to analyze the expected impacts. Furthermore, the Ministry of Energy and Mines shall follow up on the results taken by each responsible authority by means of this tool.

Monitoring

Monitoring shall be made through periodic review of economic-energy statistics that describe the energy sector behavior. A system will be implemented to build a baseline which contains indicators to measure goals fulfillment advancements.

Evaluation

The performance of the Ministry of Energy and Mines and other public agencies related to the implementation of actions will be evaluated in order to measure the impact of this policy.

Glossary

Base Fee: it is calculated by the National Electric Energy Commission every five years and will be adjusted periodically by applying formulas that reflect the change in distribution costs. These rates include consumer fee, charge for peak power, charge for off-peak power and energy charge.

Biomass: Organic matter originating in a biological, spontaneous or induced process which may be used as an energy source. It refers to useful biomass in energy terms: plants transform the sun's radiant energy into chemical energy through photosynthesis, and part of that chemical energy is stored in the form of organic matter, the chemical energy of biomass may be recovered directly by burning or turning it into fuel.

Brundtland Report: socio-economic report prepared by different nations to the UN in 1987. The Committee headed by Dr. Gro Harlem Brundtland. Originally, it was called Our Common Future. In this report, it was the first time that the term of sustainable development was used, defined as one that meets the needs of the present without compromising the needs of future generations.

Climate Change: modification of weather regarding climate history at a global or regional scale.
Cogeneration: is the procedure by which electricity and useful thermal energy (steam, hot water) is obtained simultaneously.

Distributor: An individual or legal entity, owner or possessor of facilities to distribute commercially electricity.

Electric Coverage of Guatemala / Formula: coverage rate is the percentage share between electrified households negatively correlated with all households, expressed as:

$$\% \text{ coverage} = \text{electrified households} / \text{total households} * 100\%$$

Electrical energy: energy is associated with the flow or accumulation of electrons. The transitional form of electrical energy is electron flow, usually through a conductor.

Energy Mix: refers to a quantitative representation of all the energy available in a given territory, region, country, or continent to be used in various production processes. A similar concept is to offer Total Primary Energy Supply (TPES), used for example by ECLAC.

Generator: an individual or legal entity, owner or holder of a central power generation, which sells all or part of the electricity production.

Gross Domestic Product (GDP): it is a macroeconomic measure that expresses the monetary value of the country's production of goods and services during a given period of time (usually a year). GDP is used as a measure of material well-being of a society and is the subject of study of macroeconomics.

High Voltage Electrical: Voltage level exceeding sixty thousand (60,000) volts.

Hydrocarbons: hydrocarbons are organic compounds composed solely of carbon and hydrogen atoms.

International Electrical Interconnection: Transmission line power that connects two or more interconnected systems of different countries.

Kilowatt (KW): Power unit equivalent to one thousand watts.

Kilowatt hour (kwh): is a unit of energy equal to the energy produced by a power of one kilowatt (kW) for one hour, equal to 3.6 million joules. Usually it is used for electrical energy billing, since it is easier to use than the SI unit of energy units, in joule, which corresponds to one watt-seconds (Ws). The joule is, therefore, a too small unit which would require to use wide figures.

Low Voltage: voltage level exceeding one thousand (1,000) volts.

Megawatt Unit (MW): unit of power equivalent to one million watts.

National Interconnected System (NIS): it is an interconnected transmission and transformation network of electricity connected to the main electrical generating stations and substations. It is the interconnected portion of national electric system.

Petroleum Products: a product processed in a refinery, using oil. Depending on the composition of crude oil and its corresponding demand, refineries can produce different petroleum products.

Pollution: is the harmful alteration of the natural state of a ecosystem as a result of the introduction of an agent oblivious to that environment (pollutant), causing instability, disorder, harm or discomfort to the ecosystem, in a living or the environment.

Power (electric): is the capacity to do work for a unit of time.

Self-provision: the state in which the supply of economic goods only depends on oneself, so that does not require external help, support or interaction for survival.

Single Low Voltage: Users with maximum power demand less than 100kW.

Social Fee: it corresponds to the electric supply, intended for users who consume up to 300 kilowatt hours. Social fee is a special rate focused to regulated users connected to low voltage with no demand charge, as defined in the Electricity Law and the corresponding Regulations, as

well as the Social Tariff Law. “Tariff social user” is defined as any user who consumes equal to or less than 300KW, according on a monthly bill, or having an average daily consumption up to 10KW.

SPOT Price or Price of Opportunity of Energy: it is the maximum variable cost incurred each hour to supply an additional kWh demanded.

Volatility: A measure of the frequency and intensity of changes in the price of an asset or a type defined as the standard deviation of the change in a specific timeframe. It is because there is an increased likelihood that the price of the instrument is further from the initial price as time increases.

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