

ENERGY DOSSIER

05 **GUATEMALA**



Prologue

This publication forms part of a series of monographs produced by the [Energy Division of the Infrastructure and Environment Department](#) of the Vice President of the Research Department at the [Inter-American Development Bank \(IDB\)](#) for regional public good. It is designed to increase the base of knowledge about the characteristics and functions of the Energy Sector in Latin American and Caribbean countries (LAC).

This is the first step in a project that will culminate in books that organize the countries according to the subregions in which the IDB groups the countries of LAC. The purpose of publishing each country separately is to obtain feedback from the descriptive analysis provided by local authorities, academics and the general reading public.

Comments and observations can be sent to the authors via email at: ramones@iadb.org

The sources of information are made explicit and the responsibility for their use and interpretation is exclusive to the authors of this monograph.

The authors would like to thank their supervisors at the [Inter-American Development Bank](#) for their unconditional support: the head of the Energy Division, Leandro Alves; the Manager of the Infrastructure and Environment Department, Alexandre Rosa; and the Vice President of the Research Department, Santiago Levy.

We hope that this contribution to regional knowledge will be useful,

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Introduction

This Energy Report is part of a series that includes all Latin American and Caribbean countries (LAC) that are members of the [Inter-American Development Bank \(IDB\)](#). The publications will be made in sequential order and grouped according to the geographic regions organized by the [IDB](#) in the following order: countries of the Central American Isthmus and the Dominican Republic (CID); countries of the Andes (CAN), countries of the Southern Cone (CSC); countries of the Caribbean (CCB).

The Report on each country has two components: the Energy Flows and the Description of Industrial Organization and Institutional Framework of the energy sector. For both components, the most recent description will be presented first and then the historic development will be discussed.

In the case of Energy flows, the information is gathered from the energy balances that the [International Energy Agency \(IEA\)](#) produces for almost all of the countries in the world. The use of a single source allows comparisons between countries and also a long-term analysis without methodological distortions. Schematic flows derived from this information and are used to describe the energy sector in each country during a specific period.

The most recent “photo” with information from the [IEA](#) is from 2009. Even though it is from a few years ago, we used this matrix in order to ensure consistency among countries. It reflects the current situation because energy matrixes change slowly. What follows is an analysis of the historic evolution of the matrix from 1971 to 2008. It is divided into four periods: 1971-74; 1984-87; 1999-02; and 2005-08.

The reason for using an average of four years as the break between periods is to neutralize the distorting impact that sudden natural, economic and political events could have in a given year. The unit of measurement for the energy flows is thousands of barrels of oil per day (kboe/day), a simple transformation of the unit of measurement used by the [IEA](#), equivalent to tons of oil per year.

For the description of the Industrial Organization and the Regulatory Framework, the work is more complex because they don't have a single source of common information. Even when all the countries are presented under a single descriptive framework, the work of gathering basic information was ad-hoc by country.

In addition to the public information from various agencies and organizations, legal texts, academic publications and press reports are referenced. Beyond a strict description of the sector, this report seeks to link information with the political evolution of a country, which makes the reading more enjoyable and provides a clear picture of institutional changes.

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GUIDE TO ACRONYMS

AMM	Wholesale Market Management
BOO	Build-Own-Operate
CNEE	National Electricity Board
Deocsa	Western Electricity Distributor
Deotrsa	Eastern Electricity Distributor
DGE	Directorate General of Energy
DGH	Directorate General of Hydrocarbons
ECOE	Energy Marketing Company
EEGSA	Guatemalan Electricity Company
EGEE	Electricity Generation Company
ETCEE	Electricity Transport and Control Company
FONPET	Fund for National Economic Development
GDP	Gross Domestic Product
GWh	Gigawatt Hour
Hispanoil	Hispanic Oil
IEA	International Energy Agency
IEMA	Commercial Agricultural and Tax Company
INDE	National Electrification Institute
ISLR	Income Tax
kV	Kilovolt
KWh	Kilowatt hour
LGE	General Electricity Law
LH	Hydrocarbon Law
Mbd	Thousands of barrels per day
Kboe/day	Thousand barrels of oil equivalent per day
MEM	Ministry of Energy and Mines
MW	Megawatt
PEO	Primary Energy Offering
PEP	Primary Energy Production
PPA	Power Purchase Agreement
SIN	National Interconnected System
TEC	Total Energy Consumption
Tresca	Central American Energy Transporter
WB	World Bank



Guatemala

With a gross domestic product of USD 37.7 billion (2009) and an area 107,160 thousand square kilometers (Km²), Guatemala has the largest economy in Central America aside from Mexico. Its population in 2009 reached 14 million people, and its GDP per capita was \$2,661 USD.

About 51% of the Guatemalan population lives in rural areas, a percentage that matches the segment of the population living below the national poverty line. It ranks 116/169 on the Human Development Index (2010) and has a level of electricity coverage of 83.5% (2009).

In relation to the energy sector and in particular the electricity subsector, in 2010 Guatemala had an installed generation capacity of 2474.5 MW, the second highest aside from Costa Rica, and a maximum demand of 1467.9 MW. Given this capacity, it offered 7914.1 GWh of energy internally and imported a net 223.4 GWh.

In the hydrocarbon subsector, Guatemala is the second largest oil producer in the region after Mexico and has historically been a net exporter of crude and a net importer of derivative products, which makes it a net importer of oil. In 2010, its annual crude production was 4.3 million barrels of which it exported 3.86 million, nearly 90% of its total production. That same year, its internal consumption of crude and derivatives reached 26.2 million barrels, a volume that was covered almost exclusively by imports (70% from the USA) and by the contribution of “La Libertad” refinery, which in 2010 refined a total of 472.7 barrels of derivative products.

Current Energy Sector

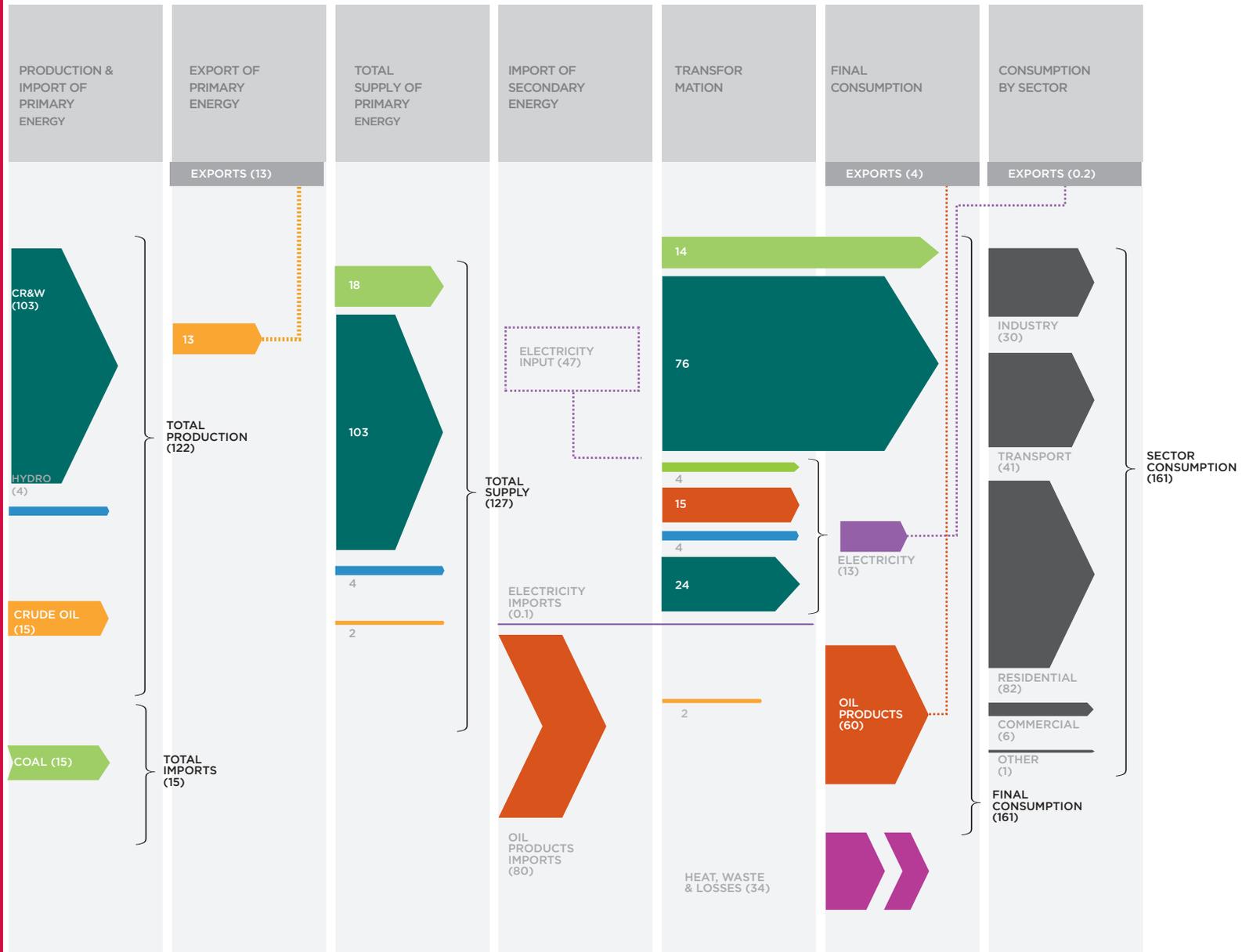


In 2009 Total Energy Consumption (TEC) in Guatemala reached 207 thousand barrels of petroleum equivalent per day (kboe/day). It was an increase of 22% over the average during the 2005-08 period. The composition of total consumption changed slightly between 2005 and 2009. Biofuels (especially the firewood consumed in rural zones) remained the main source of consumption, and imports of coal increased while hydraulic energy use decreased.

CURRENT

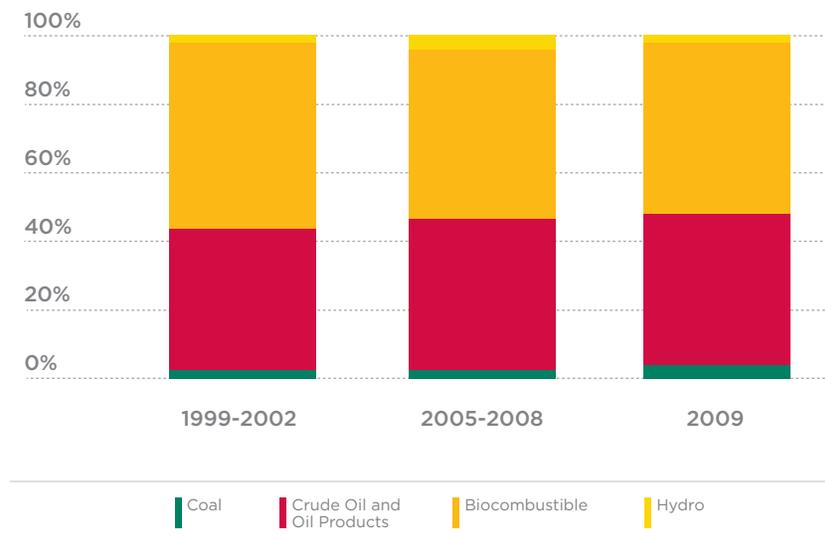
Energy Flow

(kboe/day)



While biofuel consumption continued to represent 50% of the total use with almost 103 kboe/day, composed 80% of firewood consumption in rural areas of Guatemala, other energy sources showed changes in the following ways: imported coal consumption increased from 8 kboe/day between 2005-2008 to 18 kboe/day in 2009, increasing its share of TEC from 5% to 9%. This increase in imported coal is due in large part to the growing demand of the San José thermoelectric plant.

TOTAL ENERGY CONSUMPTION



Source: Own Calculations based on IEA Energy World Balances

At the same time, the importance of liquid fuel consumption fell from 42% to 40% despite showing a 15% growth in absolute terms from the 2005-2008 average. In 2009 it grew from almost 71 kboe/day to 82 kboe/day. Hydraulic energy consumption also lowered its contribution to TEC from 4% to 2% with almost 3.6 kboe/day, 42% below the total average of 6.2 kboe/day between 2005 and 2008.

Production, commercial balance and primary energy offering

Production

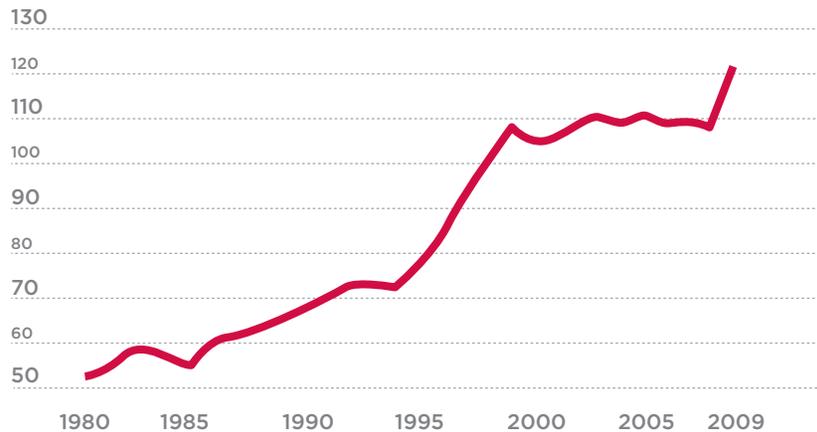
Primary Energy Production (PEP) in 2009 relied even more on biofuel, and was composed of 85% firewood. It moved from representing 78% of primary energy production to 85%, with 103 kboe/day. No other primary source came close to matching the contribution of biofuel or biomass. The importance of consumption of firewood and other biofuels is standard for the Central American region.

It is important to note that Guatemala is the only country in the region that produces crude oil - 15 thousand barrels per day in 2009, slightly below the 18 thousand barrels averaged between 2005 and 2008. The oil is mainly extracted from the Xan, Chocop, Rubelsanto and Yalpe-mech fields, all in the north of the country. They represent 12% of the PEP. The remaining 3% comes from hydraulic energy with 3.6 kboe/day in 2009, well below the annual average between 2005 and 2008 of

6.2 kboe/day. This was caused by a severe drought that lowered water levels in the main hydroelectric plants in the country, including Chixoy with 300 MW of installed capacity.

PRIMARY ENERGY PRODUCTION

Thousand barrels of oil equivalent per day (kboe/day)



Source: Own Calculations based on IEA Energy World Balances

In last place and lagging in the PEP were solar and wind energy. The energy parks Tilará (19.8 MW, opened in 1996), Molinos Viento del Arenal (24 MW, opened in 1997), Aeroenergía (6.75MW, opened in 1998), Tejona (19.8 MW, opened in 2002) and Western Lake Arenal (23 MW, opened in 2005) were in operation in 2009. As was mentioned above, Costa Rica also had a small solar energy generation

capacity of 0.14 MW. Based on this infrastructure the country produced 0.6 kboe/day – 50% above the total averaged between 2005 and 2008 from these sources.

Commercial balance of primary energy

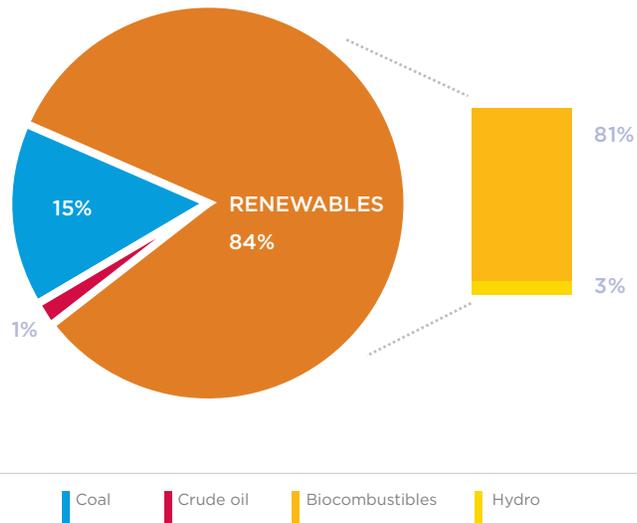
90% of crude production in Guatemala is destined for export – 13 thousand barrels per day of the 15 thousand produced per day. Coal imports increased significantly from 8 to 15 kboe/day, driven in part by the incorporation of electric plants like San José that use this source of fuel for generation.

Domestic supply of primary energy

Taking into account domestic production and the commercial balance of primary energy in Guatemala during 2009, the Primary Energy Supply (PEP) was 127 thousand barrels of equivalent per day. Like most of the countries in the region, the primary offering depended largely on the biomass supply.

In Guatemala's case, this source represented 81% of the PES. Along with the hydraulic supply of 3%, renewable energy contributed 84% of the primary offering in 2009. Fossil fuels represented the remaining 16%, composed of 15% coal supply and 1% crude oil refined in the country.

PRIMARY ENERGY SUPPLY



Source: Own Calculations based on IEA Energy World Balances

Electricity

Installed capacity

Installed capacity for electricity generation in Guatemala experienced a significant growth in the last decade of approximately 60%. This growth was largely driven by the incorporation of additional generation capacity in the form of new plants, including medium sized private hydraulic plants like Las Vacas, Renace and El Canada. Thus the generation capacity grew from 540 MW to 778 MW, an increase of 44% from 2000.

It should also be noted that the incorporation of geothermal plants like Calderas and Orzumil during the decade of the 2000s could be explain the increase in non-hydroelectric installed capacity. This increase is reflected in the growth from 29 MW to 340 MW between 2000 and 2009.

Finally, the growth of thermoelectric plants in the last decade was 38%, in part due to an increase in the use of coal and the incorporation of private property thermo generation plants, which will be described in the following sections.

Installed Capacity (MW)	2000	2005	2009
Total Renewables	569	746	1118
Hydroelectric	540	717	778
Non-hydroelectric	29	29	340
Thermoelectric	1125	1345	1555
Total	1694	2091	2673

Source: U.S. EIA

Inputs to electricity generation

Guatemala	2005-2008		2009	
Inputs to electricity (kboe/day)	32.8	100%	46.8	100%
Oil products	11.7	36%	15.4	33%
Coal	5.4	16%	3.6	8%
Renewables	15.7	48%	27.8	59%

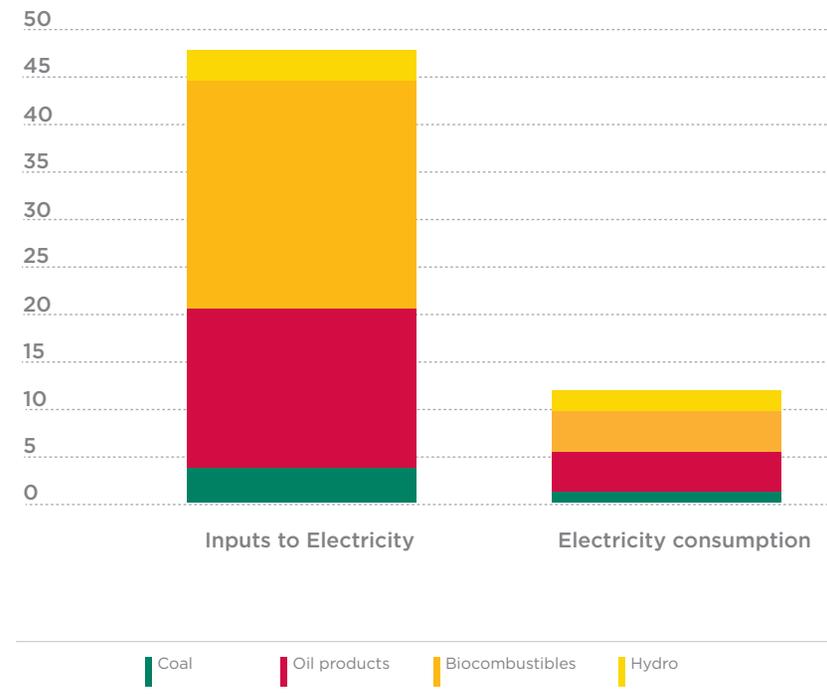
Renewables include hydro, biocombustibles, geothermal, and other renewable sources
Source: Own Calculations based on IEA Energy World Balances

According to IEA information, which, as noted above in the case of Guatemala, excludes geothermal energy, consumption for electricity generation in Guatemala maintained the same general patterns. The relative importance of each energy source remained intact with renewables – mainly biomass – in first place with 59%, followed by liquid fuels with 33% and coal in third place with 8%. However, it is important to note that Guatemala became more dependent on electricity generation from biomass and hydraulic energy, which grew from 48-59% of the generation input.

This growth was due primarily to an increase in the use of biomass in electricity generation, growing from 10 to 24 kboe/day, mainly in large factories that use bagasse such as Magdalena, Pantaleón, La Unión, Santa Ana and Concepción.

Electricity matrix

ELECTRICITY MATRIX (Kboe/day)



Source: Own Calculations based on IEA Energy World Balances

Electricity consumption in Guatemala in 2009 reached 9,040 GWh, equivalent to 12.9 kboe/day. This rate is slightly above the 2005-08 average of 12.19 kboe/day. Without taking into account geothermal, electricity generation in Guatemala is divided into three main sources: biomass, liquid fuels and hydropower. Given its low efficiency, biomass represented almost 50% of generation input, but only 34% of consumed electricity.

Meanwhile, hydroelectric power was around 10% of the input, but represented 23% of generation for the same reason – efficiency. Liquid fuels, with 35% of generation and 33% of input, also showed a significant change between input and consumption due to efficiency rates. The 9,040 GWh consumed in 2009 were mainly distributed in the industrial sector, which represented 40% of electricity consumption in the country. It was followed by the residential and commercial sectors with 33% and 27% respectively.

Secondary balance and final consumption

Secondary energy balance

Since it doesn't produce enough crude oil nor does it have the refining capacity, in order to meet internal liquid fuel demand Guatemala imports significant amounts of derivative petroleum products. In 2009 this figure reached almost 80 kboe/day, 14% higher than the average total between 2005 and 2008 of 70 kboe/day. Maintaining its historic patterns, Guatemala exported 4 kboe/day of derivatives

during 2009, 2 kboe/day higher than the average between 2005-2008. Finally, it is worth noting that small amounts of electricity, 0.1 kboe/day imported and 0.2 kboe/day exported, were exchanged for geographical reasons.

Final consumption by sector

In 2009 final consumption in Guatemala reached 160 kboe/day, 15% higher than the 2005-08 average and deeply oriented towards the residential sector, as is the pattern in the rest of Central America, given that this sector is 51% of the total with 82 kboe/day. This refers to a decrease of 3% over the 2005-08 average, due mainly to an increase in consumption in the transportation and commercial sectors. Residential use was composed as follows: 90% biomass, 5% electricity and 5% petroleum derivatives, maintaining historical patterns and high biomass use.

The next consumer was the transportation sector with 41 kboe/day, which represented 25% of the total, slightly above the 2005-08 average. This sector used only derivative petroleum products. Industrial consumption came in third place with 30 kboe/day and 19% of the total. Guatemalan industry had relatively diversified consumption from three sources: 49% coal, 34% petroleum derivatives and 17% electricity.

Lastly, commercial and other sectors represented 5% of the total. Commercial use was 57% electricity, 41% biomass and 2% petroleum derivatives. These patterns are similar to those seen in other countries in the region.



Institutional Organization of the Energy Sector

Institutional Structure

The energy sector in Guatemala has four fundamentally relevant state actors and significant private sector participation. In charge of the direction and formulation of policies are the Directorate General of Energy (DGE), and the Directorate General of Hydrocarbons (DGH), both belonging to the [Ministry of Energy and Mines \(MEM\)](#). Unlike other countries in the region, Guatemala doesn't have a singular regulatory agency for the energy sector. The [National Electric Energy Board \(CNEE\)](#) is an organization in charge of these activities for the electricity subsector while the DGH serves the dual function of directing policies and acting as a regulator for the hydrocarbon subsector.

In the electricity subsector, what stands out is the participation of the [National Electrification Institute \(INDE\)](#) via the Electric Power Generation Company, which manages nearly 23.3% of the total installed capacity in the country.

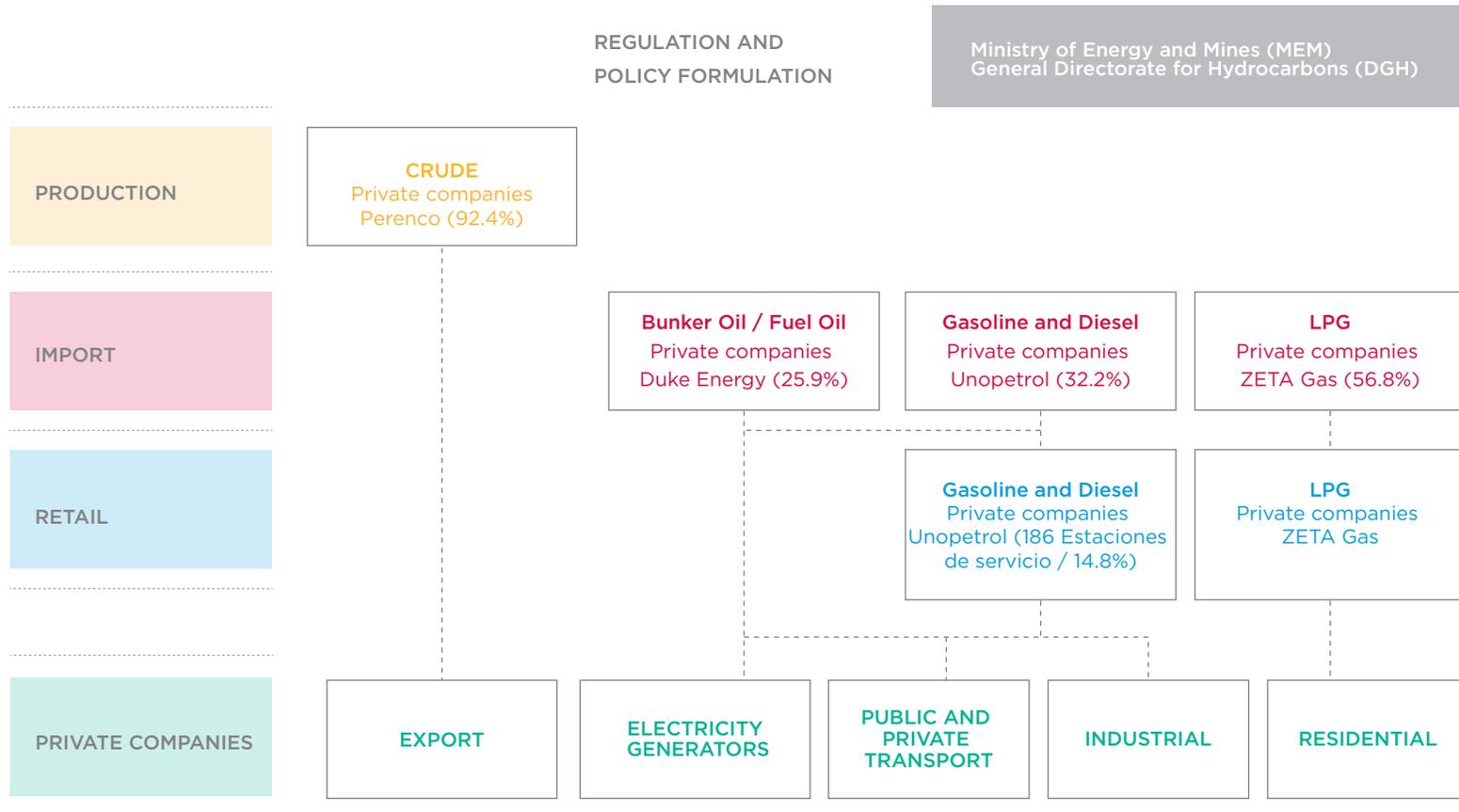
Private sector participation in the electricity business was driven by the enactment of the General Electricity Law (LGE) in 1996. In the generation sector, 44 private plants coexist and together manage 76.7% of installed capacity. In the transmission sector, Guatemala is ranked as the only country in Central America with effective private sector participation. It handles about 15% of the high voltage networks on a national level, while the remaining 85% are managed by the Electricity Transport and Control Company (ETCEE), property of the State. Finally, in the distribution sector, there are three companies that participate in the national market which together achieve a national coverage of 84%

(WB 2011). These are the [Guatemalan Electricity Company \(EEGSA\)](#), which was born of the dissolution of the vertically integrated state monopoly the [INDE](#) and the companies [Deocsa](#) and [Deorsa](#), belonging to the Spanish group Unión-Fenosa. At the end of 2010, [EEGSA](#) supplied 49.2% of the effective demand on a national level. The group Unión-Fenosa, meanwhile, supplied the remaining 50.8% distributed in the following manner: [Deorsa](#) 20.3% and [Deocsa](#) 30.5%.

Regarding the hydrocarbon subsector, the importance of openness and participation in the private sector stands out. Average crude production in the country reached 12 thousand barrels per day, controlled 90% by the English-French company Perenco, in charge of the main site, Xan. Recently, however, a new round of bidding opened for new exploration and exploitation operations.

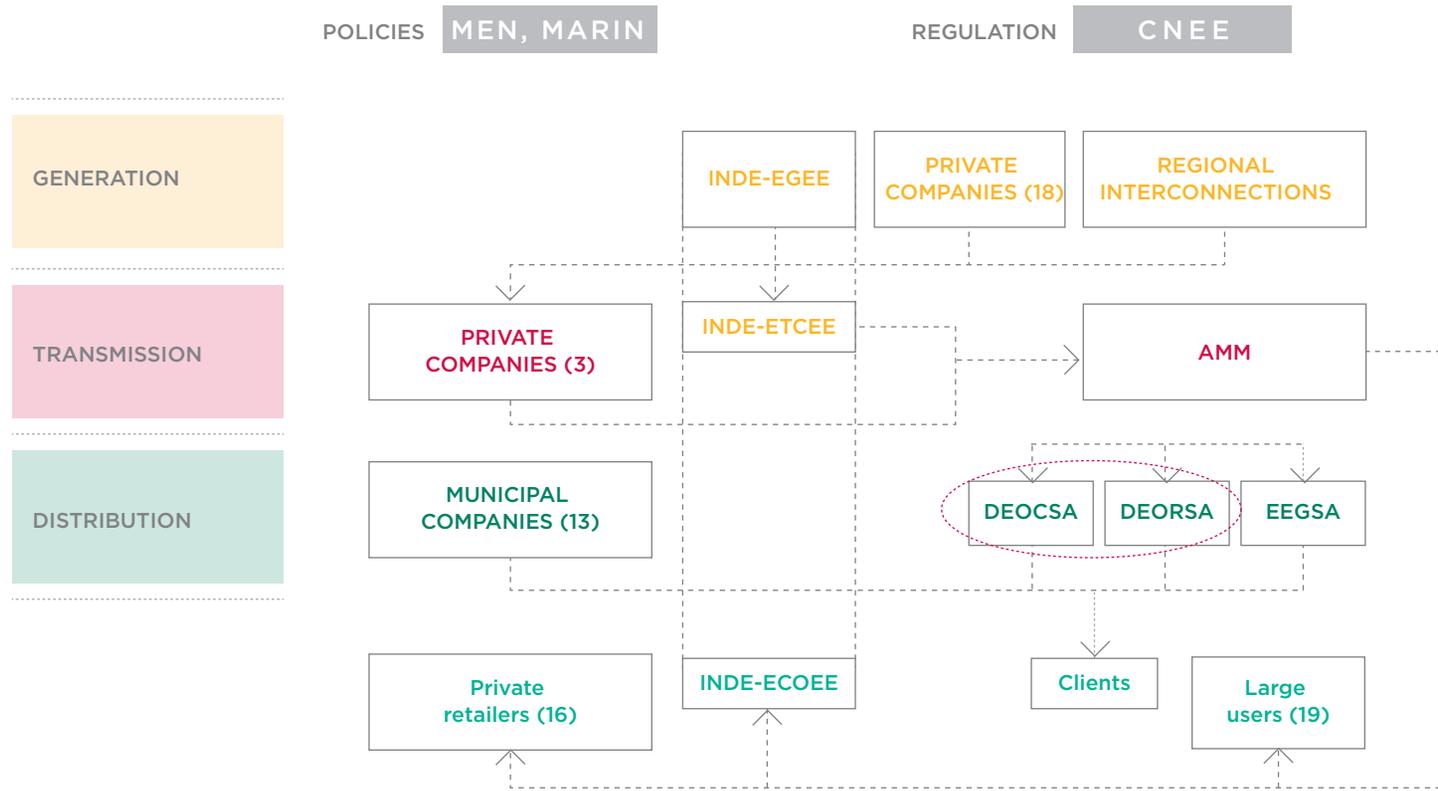
Guatemala has a single refinery that produces mainly asphalt and is also property of the Perenco group. The same company owns crude transportation lines and pump stations. The derivatives market is open to competition among national and foreign companies who want to participate. Currently there are seven marketers of petroleum derivatives and five of liquefied gas.

Hydrocarbon Sub-sector Structure, 2011



Source: Author's work based on MEM, CEPAL and regulatory framework

Electricity Sub-Sector Structure, 2011



Source: Author's work based on MEN, MARIN, CNEE, ECLAC, and regulatory framework

Policy formulation for the energy sector

The [Ministry of Energy and Mines \(MEM\)](#) is the State body responsible for developing and coordinating policies, plans and programs related to the energy sector in Guatemala.

It is responsible for ensuring that the authorization process for the installation of plants and the provision of the services of hydrocarbon exploration, exploitation, transportation and distribution are in accordance with current laws. Also, it should address concerns regarding the legal system for the generation, transmission, distribution and marketing of electricity. It is also responsible for mining exploitation policies.

According to the Organic Law of the Executive Board¹ in article 34, the [Ministry of Energy and Mines](#) should “be responsible for issues regarding the legal system related to energy and hydrocarbon production, distribution and marketing and the exploitation of mining resources.” As a consequence, the following roles were assigned to the MEM:

- To study and promote the use of new and renewable energy sources; to promote its rational use and to encourage the development of energy in its different forms, trying (...) to achieve energy self-sufficiency in the country.

- To coordinate the actions necessary to maintain an adequate and efficient supply of oil, petroleum products and natural gas according to the demands in the country and in accordance with related laws.
- To implement and enforce legislation related to the surface detection, exploration, transportation, and transformation of hydrocarbons and the buying and selling or any type of marketing of crude or reconstituted petroleum, natural gas and other derivatives as well as derivatives of those sources mentioned.
- To formulate policy, to propose related regulation and to supervise the system of exploration, exploitation and marketing of hydrocarbons and minerals.
- To propose and enforce environmental regulations on energy.
- To issue an opinion on the scope of its jurisdiction over the policies and projects of other public institutions that indicates the energy development of the country.
- To exercise regulatory, control and supervisory roles related to electricity and the laws governing it.

To meet with these objectives, the Internal Organic Regulation of the [Ministry of Energy and Mines](#)² states that the MEM is composed of four general directorates called Administrative Services, Energy (DGE) Mines and Hydrocarbons (DGH). The latter also operates as the regulatory unit for the hydrocarbon subsector.

¹ Law of the Executive Board. Decree 114-97. Enacted on December 10, 1997. Published in the Diario Oficial on December 12, 1997.

² Internal Organic Regulation of the Ministry of Energy and Mines. Government Agreement 382-2006. Enacted on June 28, 2006. Published in the Diario de Centro América No. 66 on June 7, 2006.

Regulator

The [National Electric Energy Board \(CNEE\)](#) is the regulatory agency of the electricity subsector responsible for ensuring compliance with the General Electricity Law and its Regulations. It was created in 1996 with the enactment of this law. It has planning roles and is in charge of the bidding process for new generation projects and the process of expanding the high voltage transmission system. It was designed with functional independence as was established in the legislation.

Its board consists of three members named by the President of the Republic according to issues proposed by the Wholesale Market Management (AMM), [MEM](#) and university rectors. The term on the board is five non-staggered years. It receives income through fines incurred by wholesale market participants and by a rate (0.3%) for monthly electricity sales performed by distributors.

According to the General Electricity Law³ and its regulations⁴ the [National Electric Energy Board \(CNEE\)](#) is assigned the following roles:

- To ensure compliance with the obligations of the successful bidder and the licensee, to protect the rights of users and to prevent conduct that works against free competition, such as abusive or discriminatory practices.
- To define the transmission and distribution rates as subject to regulation in agreement with current law, as well as the methodology to calculate the rates.

³ General Electricity Law. Decree 93-96. Enacted on October 16, 1996. Published in the Diario Oficial on November 21, 1996.

⁴ Regulations of the General Electricity. Governmental Agreement 256-97. Enacted on March 25, 1997. Published in the Diario Oficial on April 2, 1997.

- To settle disputes arising between agents in the electricity subsector, acting as an arbitrator between parties when they have not reached an agreement.
- To issue the technical standards for the electricity subsector and regulate its compliance in line with accepted international practices.
- To issue rules and regulations to ensure free access to and use of transmission lines and distribution networks in accordance with the provisions of the law and its regulations.
- To ensure compliance with the obligations of the participants in the wholesale market and the administrator of the wholesale market, determining noncompliance, such as the need to make changes in the structure or rules through the Ministry.
- To perform verification actions in the following cases:
- To investigate complaints made by wholesale market participants
- To audit the variable costs of generators.
- To investigate unusual actions or market circumstances (...) that indicate a possible condition of collusion or abuse by the dominant position.
- To investigate the actions or facts that indicate a potential restriction (...) to free access to transportation and distribution networks.
- To investigate unusual situations in which generation is available but is not offered on the wholesale market or there is a lack of supply in the market.

- To analyze unusual activities or circumstances related to importing and exporting.
- To investigate the bad or inappropriate use of confidential information or discriminatory behavior against wholesale market agents.
- To propose improvements or additions to the Ministry of Energy and Mines to fill regulatory gaps in laws and regulations (...).
- To approve or not approve the rules and changes of coordination proposed by the wholesale market administrator, such as modifications.
- To issue general provisions and to regulate the conditions of connection, operation, control and marketing of renewable distributed generation.
- To issue technical standards, procedures and requirements for electricity transmission expansion.
- To prepare the Expansion Plan for the Transmission System.
- To develop the bidding process for adding new generation.
- To develop the bidding process for the expansion of the National Interconnected System (SIN).

The last six functions mentioned were incorporated into an amendment to the regulations of the LGE amended by Government Resolution No. 68-2007.

In the hydrocarbon subsector the regulator is the [Ministry of Energy and Mines](#) through the Directorate General of Hydrocarbons (DGH), which coordinates the Division of Oil and Marketing Subdepartment.

Electricity Sector Institutional Matrix, 2010

Generation		Transmission		Distribution	
	Installed Capacity	Company	INDE-ETCEE		EEGSA DEOCSA DEORSA Municipal companies
Hydroelectric	35.5%		(85% of networks)	Companies	
Solar & Wind	n.a.	Ownership	State	Market	Regional monopolies
Thermoelectric	62.5%				
Geothermal	2.0%	Functions	Operate the National Integrated System (NIS)	National coverage	84% (2009)
Main State-Owned Company	INDE-EGEE (23.31*)	Private participation	Allowed: 3 companies (15% of networks)	State company	EEGSA
Private Participation	Allowed				
Requirements	Minimal	Pricing policy	Toll, annual fee	Private participation	Allwoed
Registrations	44 plants (76.7%)				
Vertical integration		Wholesale Market		Concessions	Authorization required Maximum 50 years
		Tasked Unit	AMM		
Fiscal Incentives				Subsidized users	Demand < 300 kWh mensual
Import of equipment	Only renewable energy sources	Tasks	Administer the wholesale electricity market Carry out sales to the regional electricity market		
Fuels	n.a.	Retailers	16	Pricing policy	Regulated Power fee calculated as the weighted sum of the distributors purchases
Small generators	n.a.	Large users	19		
Tax exemptions	Income tax, commercial and agricultural companies tax, Renewables	Maximum demand	>100 kW		
Regulator		Comisión Nacional de Energía Eléctrica (CNEE)			
Members of the board		5			
Appointment by the President of the Republic		3 in three-candidate shortlists proposed by the AMM, MEM and university presidents			
Financing		Rate on monthly electricity sales to distributors			

Source: Author's work based on MEN, MARIN, CNEE, ECLAC, and regulatory framework

Electricity subsector

The electricity subsector in Guatemala today is characterized by the strong presence of the private sector. Its structure, in place since the LGE in 1996, is consistent with that observed in those countries where competition and free participation by economic agents are actively promoted; energy buyers and sellers freely agree on market contracts and the surpluses/deficits are emptied onto the opportunity market in a particular moment at a price set by the marginal generator (spot), which is announced by the market administrator.

On the supply side are power generators, those with capacities above⁵ MW participate in the wholesale market. Those that have lower capacities for self-consumption or co-generation (making contributions to third parties) are not subject to the coordination of the market administrator. On the demand side there are distribution companies, marketers and large users. The distribution companies with more than 15 thousand final users form part of the wholesale market, while those with a lower number of users are in a regulated market. These are usually located in rural zones where the demand by end users does not exceed 100 kWh per month.

The marketing companies that broker firm energy of at least 2 MW also belong to the wholesale market, and can offer or demand energy and power at any given time. Finally, a “heavy user” is final user with a firm demand of at least 100 KW. They may make agreements with the generators directly or be supplied by a distributor.

⁵ Decree 64-94 on February 19, 1995. Published in the Diario de Centro América No. 84 on February 20, 1995.

The National Electrification Institute (INDE) is the leading national utility company. It functions as an autonomous state agency that is financially independent,⁵ and, according to current legislation, cannot be vertically integrated. It is made up of three companies – the Electricity Generation Company (EGEE), Electricity Transport and Control Company (ETCEE) and the Energy Marketing Company (ECO), all administratively independent from each other and responsible for generation, transmission and marketing activities in the wholesale market⁶.

Generation

In the particular case of the generation sector, in 2010 there were 42 registered plants owned by 29 private companies. Together they handled 76.7% of installed capacity, while the State company INDE-EGEE managed the remaining 23.3%.

As for the distribution of generation capacity by source, during the same year 37.5% of the installed infrastructure was supplied from renewable energy (35.5% with hydroelectric technology, 2% with geothermal technology) and the rest, 62.5%, was supplied from thermal sources, mainly bunker and a small amount of diesel.

⁶ According to information from the INDE, ECOE is responsible for the marketing of goods, products and services that are bought or sold on the national and international wholesale market, such as electric power, electric energy, services for the transport of electric energy, ancillary services, imports and exports among other, with a brokerage role and without participating in generation, transport, distribution or consumption, accomplishing that purpose with the applicable legal provisions.

Overall, the Guatemalan State, through EGEE, handles the majority of renewable generation sources (57%), while private investors handled the majority of non-renewable sources (88%). Table 1 presents a description of the source and the ownership of the installed generation capacity in 2010.

Table 1. Power plant distribution by source and sector

Sources	Public	Private	Total
Primary			
Hydro	20.2%	15.4%	35.5%
Geothermal	n.a.	2.0%	2.0%
Wind	n.a.	n.a.	n.a.
Secondary			
Thermal	3.1%	59.4%	65.2%
Total	23.3%	76.7%	100%

Source: ECLAC and own calculations

Guatemalan generators may make agreements with other participants in the sale of energy and power markets and at a free price agreed on by all parties. Imbalances that can result from this interaction are covered in a market spot at a price fixed by the administrator of the wholesale market based on the marginal cost of generation. In 2010, around 90% of energy transactions were made based on the contract model and the remaining 10% based on the spot market.

Transmission

This power supply is transported through medium and high voltage lines. Guatemala has transmission network of approximately 3,750 Km (2010) distributed as follows:

- 766 Km of 230 kV lines.
- 297 Km of 138 kV lines.
- 2687 of 69 kV lines.

One of the most important characteristics of the legislature on energy issues in Guatemala and one that is in contrast with the rest of the Central American countries, is that electricity transportation is always considered free whenever it isn't necessary to use public funds, and in the case that the involve the use of these funds participation in electricity transportation requires the authorization of the MEM.

The transmission system, however, has proved insufficient to meet the growing demand for electricity in the country. Several analysts have pointed out that under the current system it is impossible to avoid overloading networks and having supply failures. For these reasons, MEM, through a study realized by the CNEE, hoped to add 845 KM of additional transmission lines in 2013. In 2010 they were awarded in open bidding to the company Central American Energy Transportation, SA. (Trecsa).

Table 2: Transmission line length by company, in kilometers, 2010

Company	Length by voltage level (km)			
	230 V	138 kV.	69 kV.	Total
ETCEE	669	297	1432	2398
Redes Eléctricas de Centroamérica S.A.	-	-	696	696
DUKE Energy International	33	-	-	33
Transportista Eléctrica de Centroamérica S.A.	64	-	559	623
Total	766	297	2687	3570

Source: CNEE

Prices for the use of transport networks (toll) are free if it is agreed upon by contracts between interested parties. For all transactions that involve the opportunity market, the toll for use of transmission networks is regulated by the [CNEE](#).

Distribution

As for the distribution sector, in Guatemala there are three big companies that participate in the wholesale market and about 13 municipal companies that supply geographic zones identified as having less than 15,000 users. Overall, the whole system has covers nearly 84% of the homes in the country (WB, 2010).

As for private companies, there are: in the central region the [Guatemalan Electricity Company SA \(EEGSA\)](#), and in the east and west of the country the [Eastern Electricity Distributor SA \(Deorsa\)](#) and the [Western Electricity Distributor SA \(Deocsa\)](#), respectively.

Before the enactment of the LGE in 1996, [EEGSA](#) formed part of the [INDE](#), which operated as a vertically integrated State monopoly. However, after the regulation came into force expressly prohibiting the vertical integration of the activities of generation, transportation and distribution, 60% of the distribution shares were bought by the groups [Iberdrola Energy SA](#), TPS de Ultramar Ltd and [EDP Electricidad de Portugal SA](#) in 1998.

For their part, the companies [Deorsa and Deocsa](#), belonging to the Spanish group Unión-Fenosa, entered the Guatemalan market in 1999 as part of another share sale transaction by the State.

By 2010, energy demand by distributors participating in the wholesale market on a national level was 5048.82 GWh, of which the [EEGSA](#) consumed 2885.2 GWh (57,15%), Deocsa 1240.3 GWh (24.57%) and Deorsa 923.3 GWh (18.29%).

Final users of the distribution service are classified into two groups according to their monthly consumption: those that consume less than or equal to 300 KWh are under a subsidized rate system or “social rate,” while those that consume greater than 300 KWh are in the “regular rate” category. The social rate was created by Decree 96-2000 and has been in effect since January 2001. Its aim is to encourage the regulated user of final distribution service with consumption equivalent to 10 KWh/day.

Under the system of subsidies established by the law, nearly 80% of residential users benefitted of whom many belonged to the country's middle class. Without necessarily needing it, they benefitted from a subsidy that, in the last decade, has become increasingly costly for the state.

Finally, coordinating and administrating the buying and selling of energy is carried out by [Wholesale Market Management \(AMM\)](#).

The [AMM](#) is a private non-profit agency created from the LGE in 1996, whose purpose is to manage the products and services that are bought and sold on the wholesale market; electric power, electric energy, electric power transport and complimentary services. According to the law its duties are:

- The coordination of operations between generation plants, international interconnections and transport lines in a context of free contracting between wholesale market agents. .
- To establish short-term market prices for power and energy transfers between generators, marketers, distributors, importers and exporters; specifically when they don't conform to the freely entered contract.
- To ensure the safety and supply of electricity in the country.
- To perform Operation Scheduling: Annually plan how they will meet the system power and energy needs.
- Monitoring the Operation in Real Time: To monitor demand behavior, the operation of the generator park, the transportation system and to maintain the security of the supply.

The following participants are agents on the wholesale market:

- Generators with a firm capacity of at least 5 megawatts (MW).
- Marketers who manage energy blocks of at least 2 Megawatts (MW) including importers and exporters.
- Distributors with a minimum of 15,000 users.
- Carriers with firm connected power of at least 10 MW.
- Large users, those with a maximum demand of at least 100 KW.

Currently 29 companies (28 private companies + EGEE) participate in the generation stage of the wholesale market. Three private companies + ETCEE participate in transmission and transportation. [Deocsa](#), [Deorsa](#) and [EEGSA](#) participate in the distribution stage. In the marketing stage, 16 companies and 19 major users participate.

Wholesale market participants conduct operations in two ways:

- An opportunity market or a spot market, with a price set on an hourly basis. The price is set by the [CNEE](#) is calculated based on the marginal short-term cost, which comes from the office of the available offer.
- The market from start to finish for contracts between agents or large users, with spaces, quantities and prices agreed on between parties.

Hydrocarbon Sector Institutional Matrix, 2011

Production		Import		Retail	
Private companies	Yes (100%)	Imports by product		Retail by product	
Contract duration	25 years. Extended up to 15 years upon expiration.	Gasoline and diesel		Gasoline and diesel	
Current contracts		Share of imports (2011)	62.9%	Total service stations	1256
Contract 2-85		Main companies (market share)	Unopetrol Guatemala (32.2%) Puma Energy (18.3%) Esso (18.3%) Chevron (12.1%) Blue Oil (10.3%) Petrolatin (8.3%)	Percentage of final consumption (2011)	64.20%
Operator	Perenco			Pricing policy	Free
Expiration date	2025			Market share	Unopetrol (186 / 14.8%) Chevron-Texaco (122 / 9.7%) Esso (94 / 7.5%) Quetzal (52 / 4.1%) Puma (20 / 1.6%) Otros (782 / 62.3%)
Market share (2011)	92.4%				
Contract 2-2009		Bunker oil or fuel oil		LPG	
Operator	La empresa petrolera del Itsmo S.A.	Share of imports (2011)	15.3%	Percentage of final consumption (2011)	11.20%
Expiration date	2024	Main companies (market share)	DEI Guatemala (25.9%) Puerto Quetzal (14.6%) Puma Energy (14.3%) Chevron Guatemala (10.7%) Uno Petrol (10.9%) Combustibles y Derivados (9.7%) Esso Standard Oil (9.6%) Gasolineras Exelentes S.A. (4.1%)	Pricing policy	Free
Market share (2011)	5.5%			Market share	Zeta Gas Tropigas Gas Metropolitano Global Gas
Contract 1-2005	Petro Latina Corporation			Bunker oil or fuel oil	
Operator	2020			Percentage of final consumption (2011)	12.50%
Expiration date	0.1%			Pricing policy	Free
Market share (2011)				Market share	Empresas de generación eléctrica Industria
Contract 1-91		LPG			
Operator	Petro Energia S.A.	Share of imports (2011)	14.9%		
Expiration date	2016	Main companies (market share)	Zeta Gas (56.8%) Tropigas (20.8%) Gas Metropolitano (12.1%) Global Gas (8.6%)		
Market share (2011)	1.9%				
Export					
90% of crude produced in Guatemala is exported. The government charges a royalty on the export of crude oil.					

Source: MEM, ECLAC, and own calculations

Hydrocarbon subsector

The [Ministry of Energy and Mines \(MEM\)](#), through the Directorate General of Hydrocarbons (DGH) is responsible for managing the policies, strategies and regulation of the hydrocarbon subsector in Guatemala.

Guatemala is, together with Belize, the only petroleum producer in Central America.

Current legislation on hydrocarbons allows the participation of private investment. The average production of the country reached 12 thousand barrels per day and had an additional storage capacity for derivatives of 4.5 million barrels (nearly 45 days of consumption), which is managed 90% by the Perenco company, in charge of the main production activities of the site (Xan), of the only refinery in the country (mainly processing asphalt) and the lines of crude oil transportation and pumping stations. 95% of production is exported to the U.S.

Although Perenco maintains control of production and refining, in 2010 it opened a round of international bidding for new exploration and exploitation operations. Additionally, the [MEM](#) web page states that the Mexican state company Pemex will invest USD \$12 million in a new refinery that will start operating in 2015.

The revenue obtained by the State for the exploitation of fossil fuels comes mainly from the concept of royalties, shared production with other companies, annual charges for hectares explored and exploited, oil pipeline transportation and fines on participating companies.

Derivative marketing is open to competition between national and foreign companies that wish to participate. Currently there are 7 derivatives marketers and 5 liquid gas marketers.

Energy Sector Evolution



Evolution of the Energy Matrix 1971 - 2008



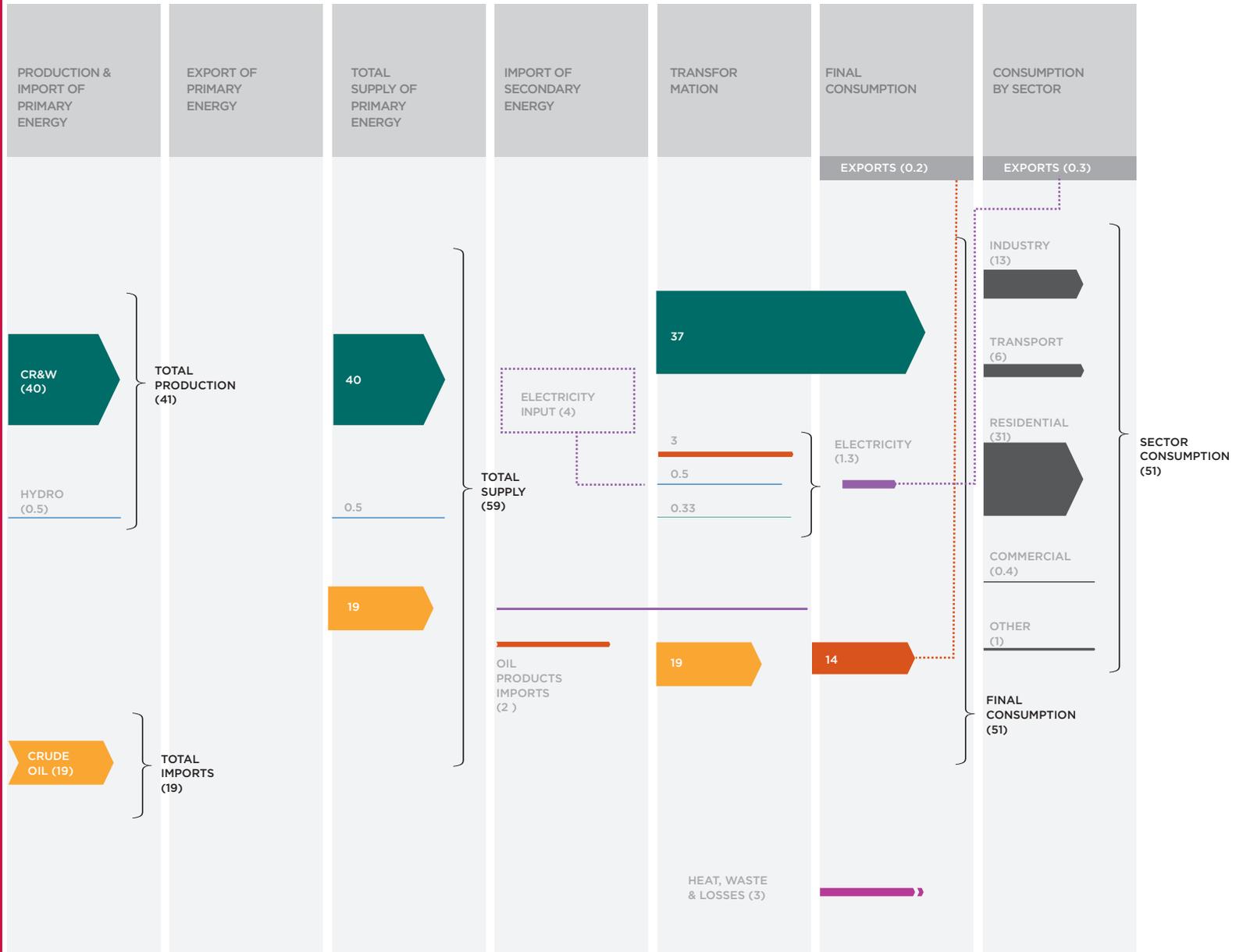
1971-1974

At the beginning of the 1970s Guatemala had a very simple energy matrix that was composed almost completely to meet residential consumption needs. The country had two important energy sources: renewable fuels (essentially firewood for residential consumption) and imported crude oil refined in the country. The country also had a small capacity for hydropower

1971-1974

Energy Flow

(kboe/day)



Total Energy Consumption

Like almost all the countries in the region, at this time energy consumption in Guatemala was dominated to a large extent by biofuels, composed mainly of firewood. Of the 61 kboe/day of energy consumed by the Guatemalan economy, two thirds were from biofuels with 40 kboe/day, 90% of which was firewood, mainly for cooking among the country's rural populations.

The second energy source for consumption - imported crude oil - made up half the total of biofuels with 18.5 kboe/day and thus represented 30% of the TEC. This petroleum was processed in the Escuintla refinery, which was inaugurated in February 1995 to supply 12 of the 14 kboe/day of derivative products consumed by the Guatemalan economy. The remaining 2 kboe/day came from imported product. Finally, note the contribution of 0.4 kboe/day of total consumption from hydraulic energy. This generation mainly came from the plants Jurún Marinalá, opened in 1970, and Los Esclavos, that began to operate in 1966.

Electricity

The generated consumption of electricity at that time depended 80% on liquid fuels in thermoelectric plants, which totaled 3.06 kboe/day. In the consumption process, this was followed by hydraulic energy with 0.4 kboe/day and biofuels (essentially thermal generation with bagasse) with 0.3 kboe/day. This energy use generated 819 GWh, of which 65% were from liquid fuels, 30% from hydropower and the remaining 5% from biofuels.

Source	Inputs (kboe/day)	%	Electricity consumption (GWh)	Electricity consumption (kboe/day)	%
Oil products	3.06	80%	535.75	0.87	65%
Hydro	0.42	11%	241.75	0.39	30%
Biocombustibles	0.33	9%	41.50	0.07	5%
Total	3.81	100%	819.00	1.33	100%

Source: Own Calculations based on IEA Energy World Balances

Final consumption by sector

The residential sector represented 60% of final consumption with almost 31 kboe/day and had a big advantage over the other Guatemalan economic sectors. Residential consumption was 95% biofuels due to the high level of rural population in Guatemala at that time. The second largest was industry with 13 kboe/day – 60% biofuels and 38% derivatives – representing 25% of final consumption. Transportation consumption, all from derivatives, was 11% of the total with almost 6 kboe/day.

Consumption by sectors	Industry	Transport	Residential	Commercial	Others
Oil products	37.6%	100%	4.2%	15.4%	100%
Biocombustibles	57.9%	0.0%	94.6%	0.0%	0.0%
Electricity	4.5%	0.0%	1.2%	84.6%	0.0%
Total	100%	100%	100%	100%	100%

Source: Own Calculations based on IEA Energy World Balances



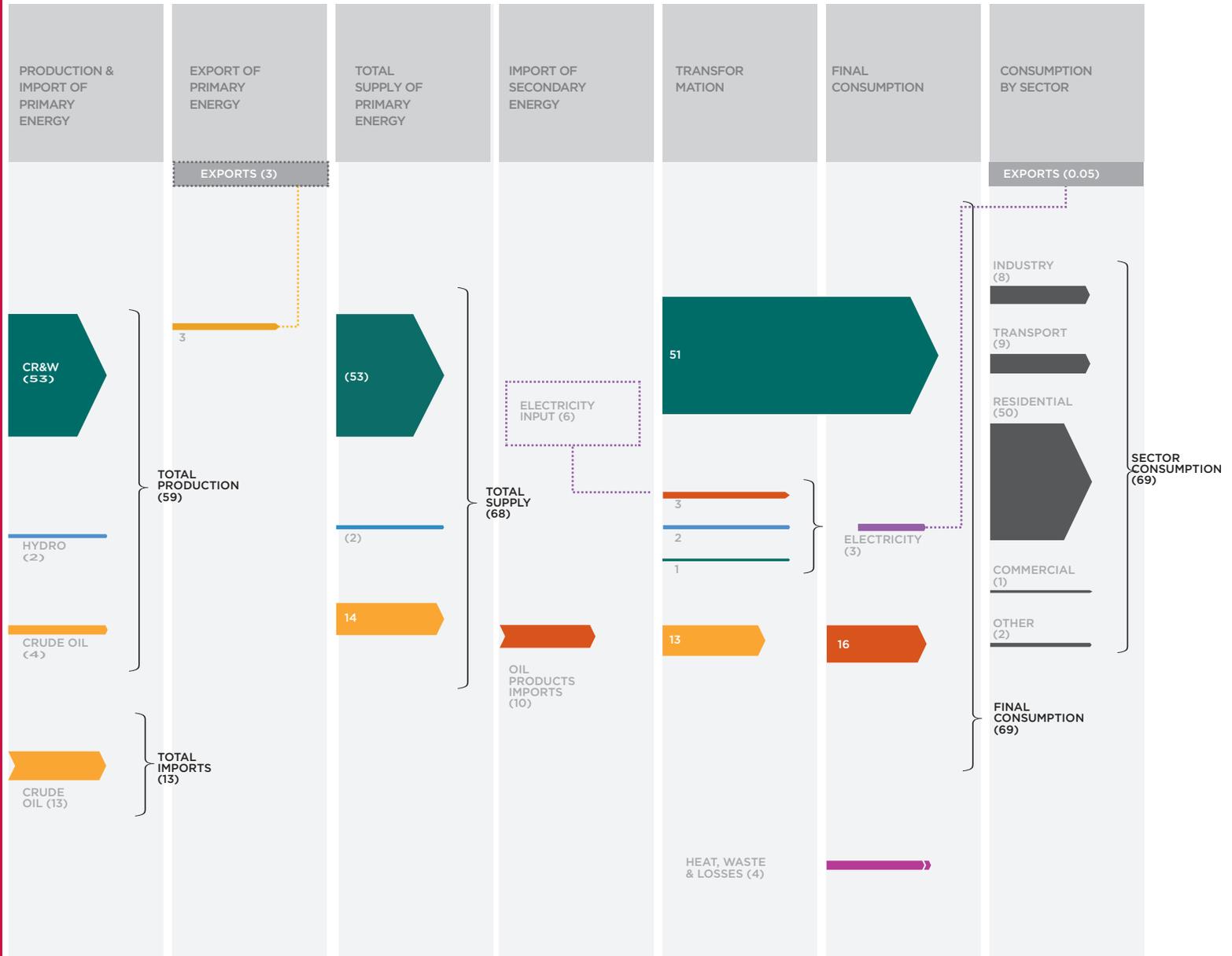
1984-1987

The Guatemalan energy matrix experienced important changes between 1974 and 1984. The most significant was the beginning of national crude production during the early 80s. This led to a reduction in net petroleum imports, as well as the beginning of crude exploration. The growth of hydraulic infrastructure and the continued dominance of residential consumption, particularly of firewood in rural zones, were also important.

1984-1987

Energy Flow

(kboe/day)



Total Energy Consumption

Registering a growth of 29% over the previously analyzed period, total Guatemalan energy consumption reached almost 79 kboe/day. Once again biofuels represented the bulk of this statistic with almost 53 kboe/day and 67% of TEC. Consumption from this source grew 32% over the previous total and was composed 80% of firewood consumption.

Crude imports stayed in second place with around 13 kboe/day. After more than ten years of exploration in different fields and geological faults in search of potential oil, it was discovered and several wells were drilled at the end of the 70s. The development of Caribe, San Diego, Yalpemech, Tierra Blanca, Tortugas, Rubelsanto and Chinaja Oeste were productive. In the early 80s the Xan field was discovered, and a peak in oil activity in Guatemala began. At the end of the decade, our analysis shows that the country produced around 4.1 thousand barrels of crude per day, the majority from Xan. This oil production allowed the country to export an average of 3.3 kboe/day per year during this period.

Consumption from hydraulic energy in between the two analyzed periods grew more than 300% thanks to the 1983 incorporation of Chixoy. Since that time, it has been the largest hydroelectric plant in the country with 300 MW of installed capacity. Aguacapa, with 90 MW of capacity, was opened in 1981. With these new plants, hydroelectric consumption passed from 0.4 kboe/day to 1.8 kboe/day and represented 2% of TEC.

Electricity

Consumption of electricity generation diversified. Liquid fuels lowered from 80% to 54%, while hydropower increased to 30%. Biofuels represented 16% of this consumption with almost 1 kboe/day. 1,773.25 GWh were generated, 60% from hydropower, 34% from liquid fuels and only 6% from biofuels.

Source	Inputs (kboe/day)	%	Electricity consumption (GWh)	Electricity consumption (kboe/day)	%
Liquid Fuels	3.32	54%	600.75	0.87	34%
Hydropower	1.84	30%	1,066.50	1.54	60%
Biocombustibles	0.97	16%	106.00	0.15	6%
Total	6.13	100%	1,773.25	2.56	100%

Source: Own Calculations based on IEA Energy World Balances

Final consumption by sector

In terms of consumption by sector, residential use grew in importance from 60 to 72% of the total with 50 kboe/day, 94% biomass. Transportation energy use grew from 6 to almost 9 kboe/day and was 11% of the total, composed entirely of liquid fuels. Industrial consumption fell to third place, reducing its consumption 40% from 13 to 8 kboe/day. It was also less than 11% of the total, consuming 50% biofuels, 40% derivatives and 10% electricity.

Consumption by sectors	Industry	Transport	Residential	Commercial	Others
Oil products	39.5	100	4.3	34.2	99.6
Biocombustibles	50.0	0.0	94.0	0.0	0.0
Electricity	10.5	0.0	1.8	65.8	0.4
Total	100%	100%	100%	100%	100%

Source: Own Calculations based on IEA Energy World Balances

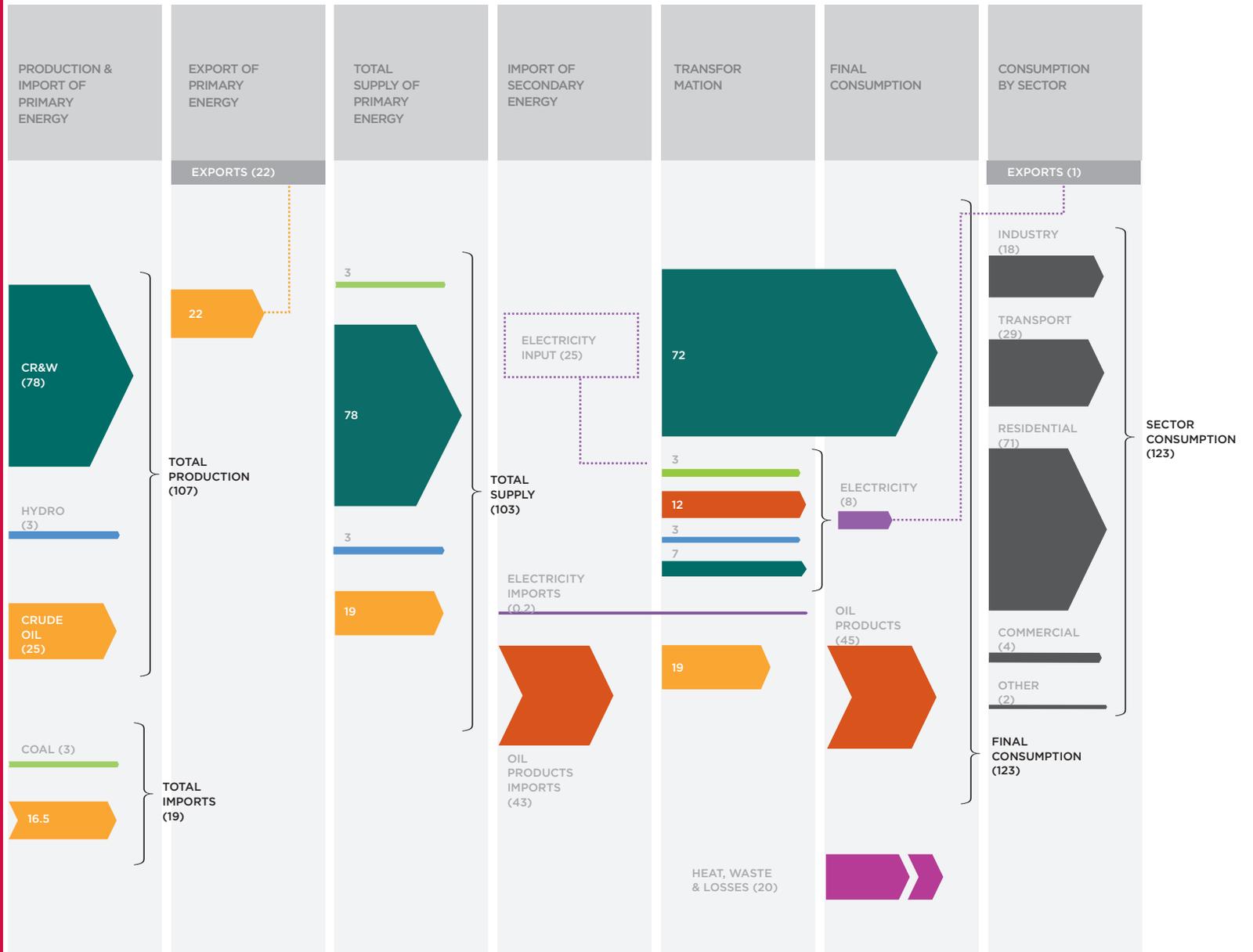


1999-2002

At the beginning of the century, Guatemala registered the most dramatic change in its energy matrix in our analysis. It became both a producer and an exporter of crude, increased its consumption of biofuels, doubled its consumption of hydraulic energy, quadrupled derivative imports and began to import coal.

Energy Flow 1999-2002

(kboe/day)



Total Energy Consumption

With these changes, total energy consumption reached 147 kboe/day, 87% higher than the previous period. Thanks to the exploitation of the Petén petroleum deposits – particularly Xan field – Guatemala became the only exporter of crude in Central America, producing 25 mbd and exporting 22 mbd. During this period, imported crude reached 16.5 mbd. The refining capacity did not meet the growing demand for derivative products in Guatemala, so imports of liquid fuels grew 326% between 1987 and 1999 to total 43 kboe/day.

Consumption of biomass continued being far from the main source of energy in the country with 78 kboe/day and 53% of TEC. Among renewable resources, consumption of hydraulic energy almost doubled to total 3.4 kboe/day and maintained its participation in TEC at 2%. This growth is due to the incorporation of several private hydroelectric plants such as Secacao (15 MW of capacity, opened in 1998), Poza Ver-

de (8 MW, 2000), Matanzas (12 MW, 2002), Las Vacas I (20 MW, 2001) and Renace (60 MW, 2002) and taking more advantage of the resource in public plants. Lastly, during this period, Guatemala began to import carbon – 2.5 kboe/day and 2% of TEC – after the construction of the electric coal plant San José, property of TECO Guatemala.

Electricity

With the increase in imports of derivatives and in crude production, liquid fuels maintained their position in the consumption of generation with 49% and 12 kboe/day. Biofuels moved to second place with 27% from 7 kboe/day, while hydropower was in third place with 14% and 3.4 kboe/day. Imported coal represented 10% of generated consumption. From this consumption 5,820.25 GWh of electricity were generated, of which 42% were derivatives, 34% hydropower, 15% biofuels and 9% carbon.

Source	Inputs (kboe/day)	%	Electricity consumption (GWh)	Electricity consumption (kboe/day)	%
Coal	2.54	10%	514.25	0.62	9%
Oil products	12.02	49%	2,471.25	2.99	42%
Hydro	3.43	14%	1,987.25	2.40	34%
Biocombustibles	6.65	27%	847.50	1.03	15%
Total	24.64	100%	5,820.25	7.04	100%

Source: Own Calculations based on IEA Energy World Balances

Final Consumption by Sector

Residential consumption fell from 72% to 57% of final consumption, using 90% of its energy from biofuels and totaling 71 kboe/day. Transportation stayed in second place with 23% of the total and 29 kboe/day - a growth of 230% - while industry grew 126% and divided its consumption in 43% biofuels and 43% derivatives, to reach 18 kboe/day and 15% of the total.

Consumption by sectors	Industry	Transport	Residential	Commercial	Others
Oil products	42.8	100	6.3	47.8	94.8
Biocombustibles	42.5	0.0	90.3	2.6	5.0
Electricity	14.7	0.0	3.4	49.6	0.0
Total	100%	100%	100%	100%	100%

Source: Own Calculations based on IEA Energy World Balances

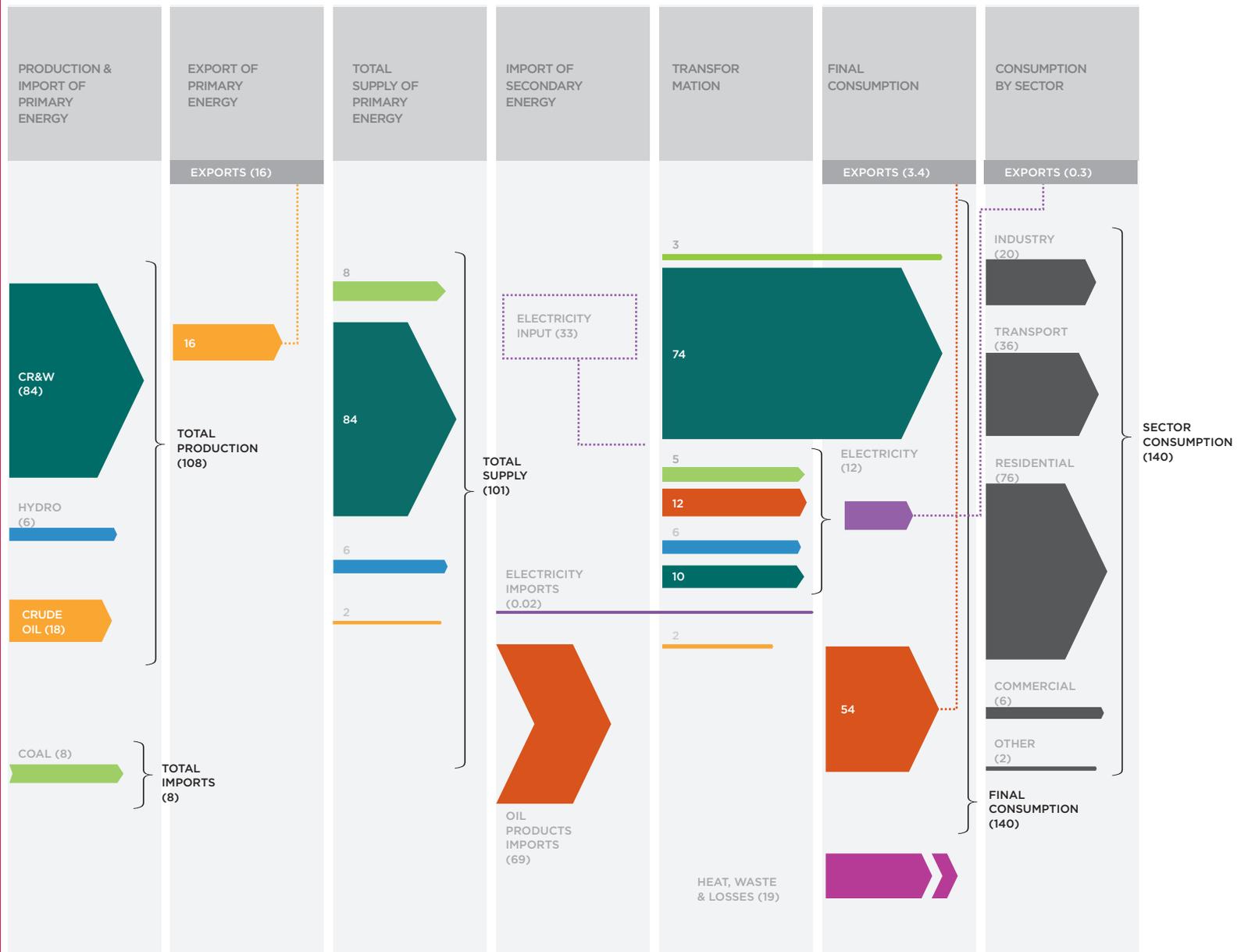


2005-2008

At the end of the past decade, Guatemala reduced its production of crude and started to import more derivatives, which substituted the crude imports. Consumption of hydraulic energy almost doubled, foreign coal purchases quadrupled and biofuels continued to be the most important energy source in the country. The residential sector maintained its advantage over other sectors of the economy.

Energy Flow 2005-2008

(kboe/day)



Total Energy Consumption

In 2002, Chevron Texaco agreed with the Guatemalan government to close the Escuintla refinery, and thus the country stopped importing crude to refine. To counter the closing of Escuintla and maintain the supply of liquid fuels, imports of derivatives grew 60% over the previous period and totaled 69 kboe/day, representing 41% of TEC. Crude production reduced from 19% to 17.8 mbd, of which 16.3 mbd were exported. The rest, 1.8 mbd (1% of the TEC) was processed in the La Libertad refinery in Petén.

For its part, the consumption of hydraulic energy grew 82% thanks to better use of existing plants and the opening of the new plants Las Vacas II (26 MW, 2002), Renace (60 MW, 2002), El Canada (47 MW, 2003) and Montecristo (13 MW, 2007). Hydraulic energy reached 6.2 kboe/day to represent 4% of the TEC during this period.

As has been its historic pattern, biomass continued to be the largest Guatemalan energy source. Between 2005 and 2008, the median consumption in the country was 84 kboe/day, higher than the average between 1999 and 2000 of 78 kboe/day. However, biomass moved from 50% to 53% of TEC - still far from the main energy source in the country. Finally, coal imports continued their growth and reached 8.1 kboe/day, representing 5% of TEC due in part to greater electricity production in the San José plant.

Electricity

Consumption of electricity generation remained highly dependent on imported derivatives with 12 kboe/day, 48% of the total. Biofuels made a greater contribution with 38% of the total and 9.5 kboe/day. Hydropower contributed 6.2 kboe/day (25% of the total) and coal was the remaining 22%. Of the total 8,235.75 GWh consumed, 44% were from hydropower, 28% from derivatives, 15% from biofuels and 13% from coal.

Source	Inputs (kboe/day)	%	Electricity consumption (GWh)	Electricity consumption (kboe/day)	%
Coal	5.37	22%	1,088.00	1.57	13%
Oil products	11.73	48%	2,333.50	3.38	28%
Hydro	6.23	25%	3,608.00	5.22	44%
Biocombustibles	9.46	38%	1,206.25	1.75	15%
Total	32.80	100%	8,235.75	11.92	100%

Source: Own Calculations based on IEA Energy World Balances

Final Consumption by Sector

As in previous periods, the residential sector consumed the majority of energy in Guatemala with 54% and 76 kboe/day, of which 89% were biofuels. Transportation consumption, entirely from derivatives, totaled 36 kboe/day and was in second place with 26% of the total. Guatemalan industry used 20 kboe/day of energy composed of 43% liquid fuels, 23% electricity, 20% biofuels and 14% coal. This sector represented 14% of consumption. The commercial sector, using 51% of its energy from electricity, reached 6.4 kboe/day, 5% of the total.

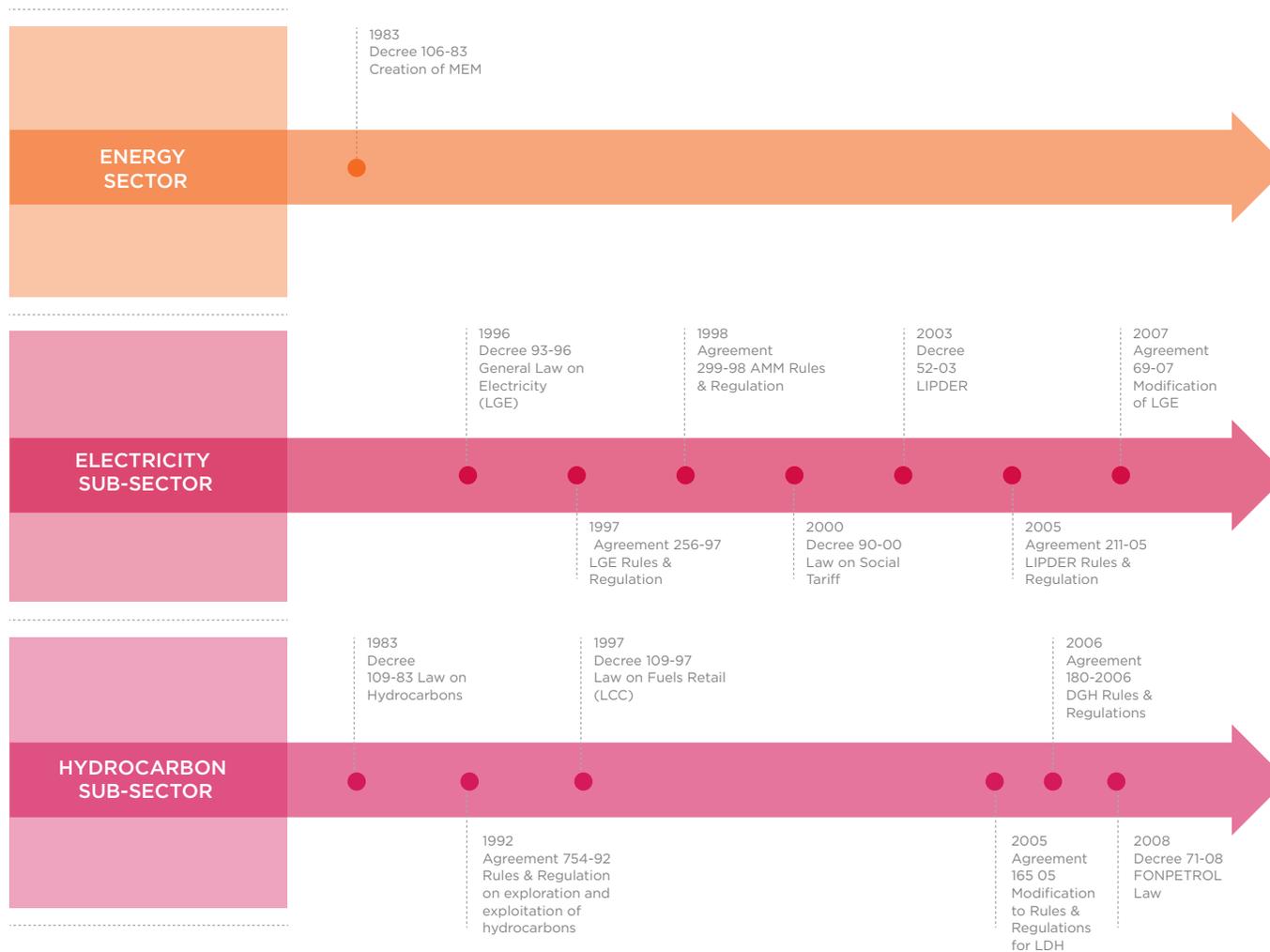
Consumption by sectors	Industry	Transport	Residential	Commercial	Others
Coal	13.5	0.0	0.0	0.0	0.0
Oil products	42.5	100	6.1	18.9	96.3
Biocombustibles	19.2	0.0	88.7	29.6	3.7
Electricity	23.1	0.0	5.2	51.4	0.0
Total	100%	100%	100%	100%	100%

Source: Own Calculations based on IEA Energy World Balances



Institutional Development of the Energy Sector

Evolution of the Regulatory Framework for the Energy Sector, Electricity Sub-Sector and Hydrocarbon Sub-sector



Source: Own Elaboration

Main reforms

Two legal instruments that promote private participation in the subsectors regulate the Guatemalan energy sector. In the hydrocarbon subsector the main legislation is the 1983¹ Hydrocarbon Law (LH), and in the electricity subsector the main legal instrument is the 1996 General Electricity Law (LGE) .

The 1983 Hydrocarbon Law marks an important milestone for the development of petroleum production in Guatemala. The publication of LH and its regulations is made as a response to the oil discoveries at the end of the 70s.

Thus in 1985, within the framework of a new law, contract 2-85 (still in force) was awarded and became the first for exploration and production in the country. This contract awards joint rights for 25 years to the companies Hispánica del Petróleo (Hispanoil) and Basic Resources International Limited (Bahamas). The oil fields included in the contract were located in the region in the north of the country, specifically in the northern basin of El Petén. Currently, contract 2-85 represents 98% of oil production in the country due to the productivity of Xan field.

For its part, the 1996 General Electricity Law created the legal framework in the electricity subsector so that the model of strong state participation that had been predominant until the mid-90s would be replaced by a model where private sector participation in electricity sector business would be promoted.

¹ Hydrocarbon Law. Decree Law 109-83. Enacted on September 15, 1983. Published in the Diario Oficial No. 11 on September 16, 1983.

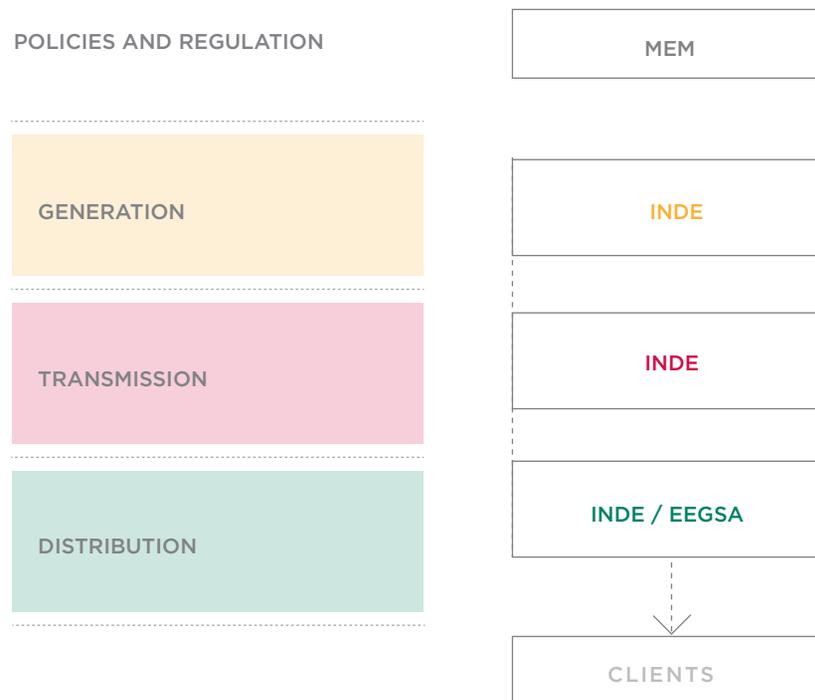
Electric crisis and PPA contracts

In the Constitution signed in 1985, after the constitutional process began in 1984 with the election of members of the Constituent Assembly, article 129 was included which states that, “the electrification of the country is nationally urgent based on plans created by the State and municipalities in which the private sector can participate.”²The inclusion of this provision was the foundation for changes that occurred in the electricity sector after the crisis of public electricity companies in the early 90s.

² Constitution of the Republic of Guatemala. May 31, 1985. Reformed November 17, 1993.

Electricity Sub-Sector Structure Before LGE

Figure 1. Electricity Sub-Sector Structure, 1990



Source: Author's work

In 1990 the Guatemalan electricity subsector was completely controlled by the State through the [National Electrification Institute \(INDE\)](#) and its distribution subsidiary [the Guatemalan Electricity Company S.A. \(EEGSA\)](#). [EEGSA](#) was incorporated into the public sector in 1972

when the concession to the operating company Boise Cascade Corporation expired. Since 1983 it has formed part of the [INDE](#). The policies were controlled by the Ministry of Energy and Mines that was created through Decree Law No. 106-83 on September 8, 1983.

The first five years of the 90s marked a period of profound change in the Guatemalan energy sector. In January 1991 Jorge Serrano Elías is elected as president of the Republic for a term of five years. Among his main challenges was the reorganization of the state electricity sector.

During the first year of the Serrano Elías government the state companies [INDE](#) and [EEGSA](#) were dragged into financial problems due to a lag in electricity rates, an increase in demand and a lack of investment. These problems, along with the prolonged drought, caused a crisis in the sector that was reflected in rolling blackouts in the country.³

In response to the public utilities crisis, the Guatemalan government began the process of contacting private companies through power purchase contracts (Power Purchase Agreement - PPA) of the Build-Own-Operate (BOO) type. This would be the first step for the entry of private companies in the country's electricity subsector.

Due to the urgency generated by the electricity crisis, the Government allowed the contracting process to be carried out by the [INDE](#) and [EEGSA](#) directly without public bidding. Additionally, in decree 38-92,⁴

³ Dussan, Manuel; Benavides, Juan. The political economy of finances and subsidies in the Guatemalan electricity sector. Inter-American Development Bank. 2004.

⁴ Decree 38-92 published in the Diario de Centroamérica on June 16, 1992. Law of Tax on the Distribution of Crude Oil and Fuel Derived from Petroleum.

it exonerated private electricity generation companies from paying import taxes on fuels.

PPA signed the first contract on January 13, 1992 with the company Puerto Quetzal Power LLC, a firm with foreign and national shareholders,⁵ for a Bunker Oil plant of 234 MW installed capacity. Subsequently PPA signed 23 contracts between 1992 and 1997 that totaled 894 MW (including Puerto Quetzal) of contracted capacity.⁶

Despite being elected for a period of five years, Serrano Elías is forced to renounce the presidency half way through his term due to his attempt to dissolve Congress. His successor was Ramiro de León Carpio, appointed in June 1993 by Congress to complete the presidential term. During the two and a half years of León Carpio's presidency, he continued to support the contracts with private generation companies and prepared the legal framework for the subsequent liberalization of the electricity sector.

In 1994 the Organic Law of the National Electrification Institute Organic Law of the National Electrification Institute. Decree 64-94 on February 19, 1995. Published in the Diario de Centro América No. 84 on February 20 1995.⁷ was signed which repealed 1959 decree 1287 that created the INDE.⁸ The new law maintained the functional and financial autonomy of the agency, reduced its roles and modified its organizational structure.

⁵ Enron held 38% of the ownership of the company, Globeleq 25% and the remaining 37% was in the hands of local investors.

⁶ Cepal. The Regional Electricity Market: PPA contracts El Salvador, Guatemala, Honduras and Nicaragua. 2001.

⁷ Organic Law of the National Electrification Institute. Decree 64-94 on February 19, 1995. Published in the Diario de Centro América No. 84 on February 20 1995.

⁸ Decree 1287 on June 9, 1959.

Since its creation in 1959, the INDE had extensive roles that include regulatory responsibilities and energy policies. With the 1995 organic law these roles were transferred to other State institutions. Among the new roles granted are:

- To determine the potential of geothermal resources and cooperate to take advantage of them. The previous law included this role only for hydraulic sources.
- To promote efficient energy use.
- To participate in the regional market.
- To install the transmission infrastructure to the rest of the electricity market participants.
- To prepare statistical information.

Similarly, the new law reduced the interference of the Executive in the appointment of Board Members. While in previous legislation the council was composed of five members appointed by the Ministry of Communications and Public Works, new legislation establishes a six member board where three are appointed by the Executive and each of the others is chosen by the business sector, unions and municipalities.

Liberalization of the electricity market

On January 14, 1996 Alvaro Arzú Irigoyen becomes president. Arzú Irigoyen's government had a liberalizing agenda. During his five year term he accelerated the process of the privatization of public companies and promoted legislative reforms that would increase the participation of private companies in the economy.

Among the priorities of the liberalizing agenda during the early 90s was the reform of the electricity subsector. Thus, in 1996, the General Electricity Law (LGE) was enacted. This law and its regulations established the regulatory bases of the whole Guatemalan electricity subsector. This piece of legislation establishes the following principles in article 1:

- Electricity generation is free and does not require authorization or previous requirement by the State.
- Electricity transmission is free when it is not necessary to use public funds or property; private distribution of electricity is also free.
- Electricity transmission involving the use of public property and the final distribution of electricity service are subject to authorization.
- The price for the provision of electricity is free with the exception of the services of transmission and distribution, which are subject to authorization. Energy transmission between generators, marketers, importers and exporters that results from the use of the wholesale market are subject to regulation.

The main contributions of the general electricity law are listed:

- To select the [Ministry of Energy and Mines \(MEM\)](#) as the body responsible for electricity sector policies.
- To create the [National Electric Energy Board \(CNEE\)](#).
- To create a private entity called the [Wholesale Market Administrator](#) who will be in charge of the wholesale market.
- To free rates for energy and power transactions between generators, distributors, marketers, importers and exporters.
- To free transmission tolls.
- To free the rates for large users (with a power demand above 100 KW).
- To prohibit the vertical integration of companies participating in the market, including public companies.
- To permit the free installation of generation plants (except nuclear plants), requiring the approval of the ministry for hydroelectric and geothermal centers of more than 5 MW.
- Exempt the electricity sector from complying with article 1520 of the Civil Code that states that the prices for public service should be determined by the Executive.
- To set the terms of obligations related to public and private property.
- To allow subsidies to projects that invest in rural electrification or are social beneficial or for the public good.

- Appealed the 1985 Geothermal law and the 1966 electricity company obligations law.

Additionally, with the approval of the LGE two institutions of fundamental relevance to the electricity subsector were created: the [National Electric Energy Board \(CNEE\)](#) as the specific regulatory body of the sector and the [Wholesale Market Management \(AMM\)](#) as the body responsible for organizing the buying and selling of energy and power among participants in the subsector. The LGE became effective in Decree Law No. 93-96, which established a framework of free contacting of electric power among wholesale market agents, thus encouraging the free market.

Article 3 of transitional provisions stipulated that at the time of the publication of the LGE existing companies should adapt to new legislation. This meant that the INDE should experience restructuring to separate its generation, transmission and distribution activities into different companies.

Thus, in 1998 the Electricity Transport and Control Company (ETCEE), the Electricity Generation Company (EGEE) and two energy distribution companies were created:⁹ [Eastern Electricity Distribution, S.A. \(Deorsa\)](#) and [Western Electricity Distributor, S.A. \(Docsa\)](#). In 2000 the Energy Marketing Company (ECOE) was created. EEGSA, the leading public distribution company, also formed part of the sector restructuring.

⁹ Resolution contained in the sixth point of Act Number 40-97 of the session celebrated by the Board of INDE on October 14, 1997.

Subsequently, the Government initiated a process of privatization that included all distribution companies. [EEGSA](#), which since 1972 had been in control of the State, was sold to a consortium led by Iberdrola of Spain. The other two distribution companies created from the breakup of [INDE, Deocsa and Deorsa](#), were sold to Unión Fenosa. In 2001 these three distribution companies served 99% of the system's clients.

Rising oil prices – social rates and renewable energy

Since 1998 oil prices have experienced an accelerated growth that had a direct impact on generation costs and, in turn, electricity rates. During the period from January 1998 to December 2000, the cost of generation in thermal plants doubled, moving from 70.6 to 141.1 US\$/MWh. Given the country's dependence on thermal energy, rates for final uses increased significantly.

In December 1999 Alfonso Portillo won the presidential elections and he took office in January 2000. His government took measures to reduce the impact of liberalized policies on the most vulnerable populations. Thus, trying to cushion the impact of oil price increases on residential electricity rates, the President signed the Social Rate Law¹⁰ through Decree 96-2000.

¹⁰ Decree 96-2000. Social Rate Law. Issued on December 19 2000. Published in the Diario de Centro América on January 2, 2001.

Decree 96-2000 fixed a subsidy to residential rates for all users whose monthly consumption was less than 300 KWh. Through this subsidy, the state helped more than 85% of people who received electricity in their homes.

The monetary burden of the subsidy was the responsibility of the INDE. The state generation company sold the energy used by distributors to supply households receiving a social tariff at subsidized prices. Over time, the INDE has remained the company responsible for financing the subsidy whose design was first modified in 2004.

The agreement on the objective to reduce dependency on fossil fuel sources of electricity generation was signed in the 2003 Law of Incentives for Renewable Energy Projects (Lidper)¹¹) which granted tariff and tax incentives for all energy electricity generation projects based on renewable energy sources. The Lidper revoked a 1986 law¹² that also granted a series of tariff and tax incentives for renewable energy projects. However, the new law included larger tax incentives such as an exemption from the Income Tax (ISRL) for 10 years and from the Tax on Commercial and Agricultural Companies (IEMA). Additionally, it maintained exemptions from taxes and tariffs for importing equipment.

This legislation is relevant in Guatemala and the rest of the Central American countries for two main reasons: the high share of thermal sources in electricity generation and the status of net importation of fuels and derivatives. In the case of Guatemala in particular, 65% of

¹¹ Decree 52-2003. Law of incentives for the development of renewable energy projects. Passed on October 8, 2003.

¹² Decree Law 20-86. Law to promote the development of new sources and renewable energy. Passed on January 8, 2003. Published in the Diario de Centro América on January 10, 1986.

its installed capacity comes from thermoelectric plants. In 2010 these plants supplied 24% of the national demand and their fuels represented 15% of the total volume of derivative imports on a national level.

The growing financial burden of the social rate

In January 2004 the lawyer and businessman Oscar Berger becomes president. His government is characterized by the high participation of private companies in his cabinet.

In his first year of government the financial burden caused to the INDE due to the application of the social rate was considerable. Thus, through resolution 34-2004 issued by the CNEE¹³ the social tariff experienced its first modification. Starting in March of that year it was decided that the subsidy would only apply to the first 100 KWh consumed for all residential users who used less than 300 KWh per month. Under this mechanism the financial burden continued to be carried by the INDE via subsidized auctions of generated energy.

The social rate later suffered three additional design changes. In 2006 it became part of the existing framework of a direct additional subsidy for homes that consumed less than 100 KWh. In 2008 the framework was modified again, this time to incorporate direct subsidies for different levels of consumption - the levels from 0 to 50 KWh, from 50 to 100 KWh and for those that consumed up to 300 KWh. Finally, in 2011, a subsidy is added to the previous framework for the first 100 KWh consumed by consumers with levels up to 300 KWh. In

¹³ CNEE. Resolution 34-2004. February 27, 2004.

2012 the derivatives electricity subsidy of the Law of Social Rates was the highest in the region.

In 2006 the government restructured the [Ministry of Energy and Mines](#), modifying its organic structure to eliminate several areas of the Directorate General of Hydrocarbons and the Directorate General of Energy. This reform sought to accelerate the operation of the agency in charge of the country's energy policies.

During the final years of Berger's government, there is an attempt to modify existing laws on market electricity to reflect new industry challenges. Thus in 2007 the following changes to LGE¹⁴ Regulation were made:

- Energy distributors should permit free access to their networks to all new renewable energy generators. This includes distributed generation.
- It modified the limits for participation in the wholesale electricity market.
- It allowed generators with a maximum power of up to 5 MW (previously the limit was 10 MW).
- It allowed marketers to buy or sell energy blocks of at least 2 MW (previously the limit was 10 MW).
- Distributors with a minimum of 15 thousand users could participate in the wholesale market (before it was 20 thousand users).

- Carriers: a minimum capacity of 10 MW (previously 10 MW).
- It modified the annual toll cost (energy transport through transmission lines) adjusting the minimum 3% of the total investment cost.
- It established that the expansion plan for the electricity sector should be carried out every two years through the Specialized Technical Body with the participation of private agents and the [National Electric Energy Board \(CNEE\)](#) for a period of ten years.

Extension of the Perenco contract and oil bidding

Álvaro Colom, the social democrat party candidate from the National Unity of Hope party, is elected in the 2007 elections. The new government's proposal centers on the fight against poverty.

During the first years of the Colom government decree 71-2008 is approved. This decree created the Fund for National Economic Development (FONPETROL), which would be financed with royalties from oil exploitation. However, the most important part of the decree is the reform of article 12 of the 1983 hydrocarbon law. This law stated that the validity of oil operations contracts could not exceed 25 years.

The reform to this article indicated that contracts could be prolonged for up to 15 years once the 25 years of operation were completed. In July 2011 this reform allowed the government to extend the exploitation contract with the oil company Perenco for 15 more years, given that it had completed the 25 years that same year.

¹⁴ Government Agreement 68-2007. March 2, 2007. Published in the Diario de Centro América No. 32 on March, 5 2007.

At the end of 2010 the government begins the bidding process for oil exploration and exploitation contracts in four areas (three in the region of Peten and the other located in the regions of Alta Verapaz and Quiché). The government estimated that potential oil production in those four areas could help the country produce up to 80,000 bpd, an increase over the 12,000 bpd that it produced at that time. The result of the bidding process was not a success given that they only received two offers for one of the areas and that they had to declare no bids for the other three. In 2012 they once again opened the bidding contracts for exploration and exploitation in the five areas.

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