

ENERGY DOSSIER

03 **COSTA
RICA**



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

ACOPE	Costa Rican Association of Energy Producers
Aresep	Public Services Regulatory Authority
BOT	Build-Operate-Transfer
CNFL	National Power Company
DGH	General Directorate of Hydrocarbons
ICE	Costa Rican Electricity Institute
IMF	International Monetary Fund
MER	Regional Electricity Market
Minaet/ MINAE	National Ministry of Environment, Energy and Telecommunications
Minerem	Ministry of Natural Resources, Energy and Mines
MW	Megawatt
PES	Primary Energy Supply
OLADE	Latin American Energy Organization
PEP	Primary Energy Production
PGR	Attorney General of the Republic
PND	National Development Plan
PNE	National Energy Plan
PUND	United Nations Development Programme
PURE	Program for the Rational Use of Energy
Recope	National Petroleum Refinery
SNE	National Electricity Service
TEC	Total Energy Consumption
USC	Social Christian Unity
WB	World Bank

Costa Rica

With a GDP of USD 29.2 billion (2009) and an area of 51 thousand square kilometers (Km²), Costa Rica is one of the leading economies of the Central American isthmus, excluding Mexico. That same year the population reached 4.6 million inhabitants with a per capita GDP of \$6,386 dollars, one of the highest in the region.

This relative wealth is accompanied by an outstanding position in terms of development. About 36% of Costa Rica's population lives in rural areas, one of the lowest percentages in Central America; the nation is 50/179 on the UNDP human development index, the highest in the region; 21.7% of the population lives below the poverty line (the lowest percentage on the isthmus); and it has the greatest electricity coverage (98.8% in 2008).

The country is rich in natural resources, with a predominance of hydraulic and geothermal potential. Since more than a decade ago, it stopped oil exploration activities with the goal of becoming a reference in terms of generating electricity from renewable sources. This goal, however, has faced obstacles given the reality of the growing energy demand and the high economic costs of generation based on local resources. Despite this fact, Costa Rica continues to be an important reference in the region in terms of energy generation from renewable sources other than firewood.

Current Energy Sector

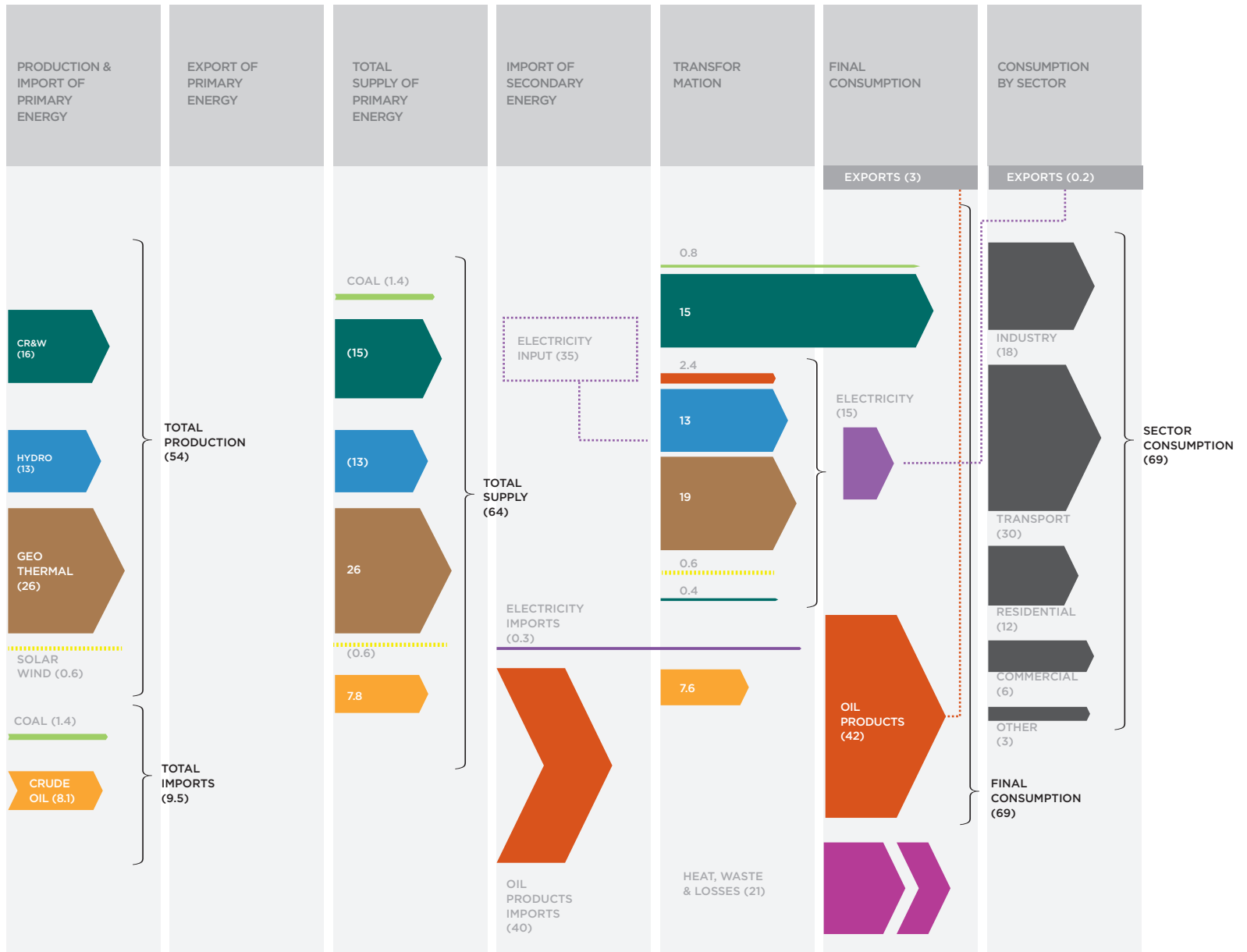


In 2009, Costa Rica had a Total Energy Consumption (TEC) of 103.9 kboe/day, which represents a growth of almost 5% over the average total between 2005 and 2008. The energy consumption pattern remained stable: slightly more than half of the energy came from renewable sources (including rural firewood consumption), while the rest of consumed energy came from hydrocarbons – crude and its derivatives

CURRENT

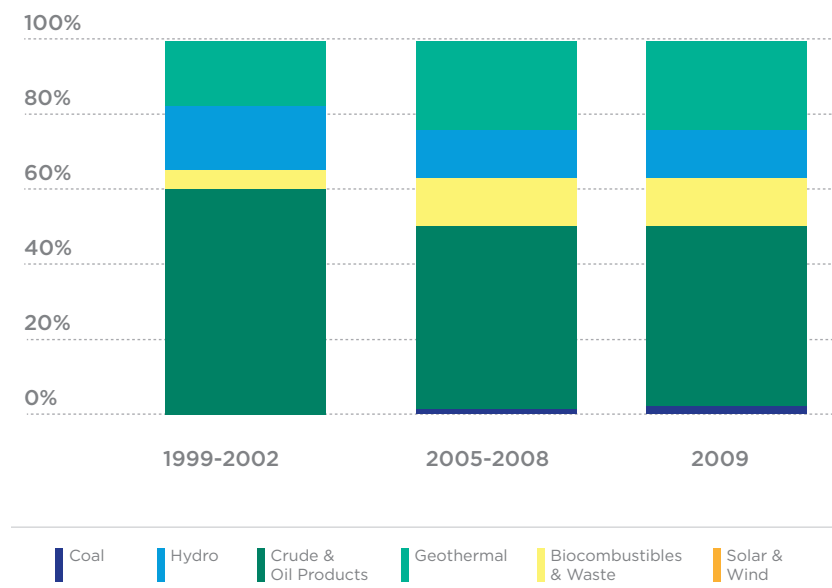
Energy Flow

(kboe/day)



The main sources of energy consumption in Costa Rica in 2009 were imported crude oil refined in the country, as well as imported derivative products that met the required supply for the internal market. These sources totaled 48.1 kboe/day, 46% of the TEC. The bulk of hydrocarbon consumption corresponds to imported derivative products, with a little more than 40 kboe/day, while imported crude totaled only around 8 kboe/day.

TOTAL ENERGY CONSUMPTION



Source: Own Calculations based on IEA Energy World Balances

Renewable energy consumption, which totaled 52% of the TEC in 2009, consisted of three main sources: geothermal, biofuels and hydraulic energy. Along with El Salvador, Costa Rica stands out in Central America for its extensive use of geothermal energy, taking advantage of its geological resources. The second largest source within the TEC was renewable fuels, which reached 15.5 kboe/day. According to [OLADE](#), the pattern of production for this source in 2009 was divided between cane products - 40% - and firewood, 60%. Hydraulic energy represented 12% of the TEC with 12.5 kboe/day, mainly from the 12 hydroelectric plants owned by the [Costa Rican Electricity Institute \(ICE\)](#).

Costa Rica also consumed energy from three much smaller sources than those described above: coal, solar and wind power. In 2009 Costa Rica imported 1.4 kboe/day, 30% above the average between 2005 and 2008, representing 1.3% of the TEC. In terms of wind consumption, according to the United States Energy Information Administration, in 2009 Costa Rica had an installed wind capacity around 70 MW. In addition, Costa Rica also has 0.14 MW solar energy capacity in 128 communities of which 83% are for property and residential use. Using this combined installed capacity of wind and solar energy, the country produced 0.6 kboe/day.

Production, trade balance and primary energy supply

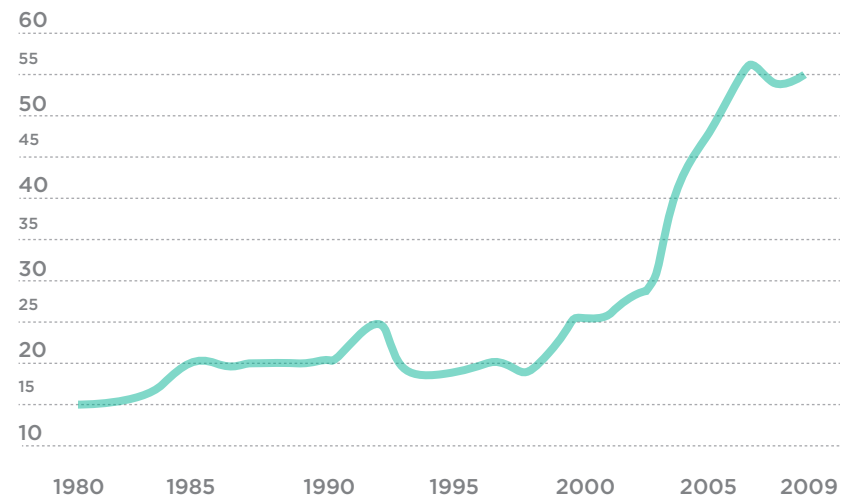
Production

Costa Rica stands out thanks to its primary energy production (PEP) from renewable sources. As partially described above, production from renewable sources totaled 54.4 kboe/day in 2009. The main source of PEP was geothermal energy from the Miravalles field with 163.5 MW installed capacity. Miravalles opened four units in 1994 (55 MW), 1998 (55 MW), 2000 (29 MW) and 2003 (19 MW), as well as a 5 MW anti-pressure unit. Costa Rica consumed almost 26 kboe/day from that field. The second source for energy production was renewable fuels – with the 15.5 kboe/day described above, composed 60% of the consumption of firewood and 40% of cane products. It is important to point out that the percentage of cane products within biofuels in Costa Rica is the highest in the region, both as bagasse for electricity generation and as liquid biofuels. The rest of the biofuels are firewood for rural consumption.

Slightly behind biofuels in the PEP is hydrogeneration with 12.5 kboe/day (23%) generated mainly in the 12 ICE plants. The first of those, La Garita, was inaugurated in 1985 and has 135 MW of installed capacity. In 1963 Rio Macho opened, and today it has a 120 MW capacity. In 1966 Cachi opened with 32 MW, expanded to 101 MW in 1967 and 1978. In 1979 Arenal opened with 157 MW. In 1982 Coribici was inaugurated, the biggest plant in the country with 174 MW. In 1990 Alberto Echangi opened (4.7 MW) and in 1992 Sandillal (32 MW). ICE also has two plants on the Toro River, inaugurated in 1995 and 1996 with 23 MW and 66 MW each. In 2000

Angostura opened (172 MW) and in 2002 Peñas Blancas opened (38 MW capacity). There are other hydroelectric plants outside of the ICE property. Among those are: Cariblanco (80 MW) inaugurated in 2008 and La Joya (50 MW) finished in 2006. Other smaller installed capacity plants are Pedro (16 MW), Platanar (16 MW) and Lajas River (11 MW).

COSTA RICA: PRIMARY ENERGY CONSUMPTION
Thousand barrels of oil equivalent per day (kboe/day)



Source: Own Calculations based on IEA Energy World Balances

Last, and falling behind in the PEP, is the production of solar and wind energy. In operation in 2009 were the wind parks Tilará (19.8 MW, inaugurated in 1996), Molinos Viento del Arenal (24 MW, inaugurated in 1997), Aeroenergía (6.75MW, inaugurated in 1998), Tejona (19.8 MW, inaugurated in 2002) and Western Lake Arenal (23 MW, inaugurated in 2005). As mentioned above, Costa Rica also has a small capacity for generating solar energy, from 0.14 MW. From this infrastructure, the country produced 0.6 kboe/day – 50% above the total average between 2005 and 2008 for these sources.

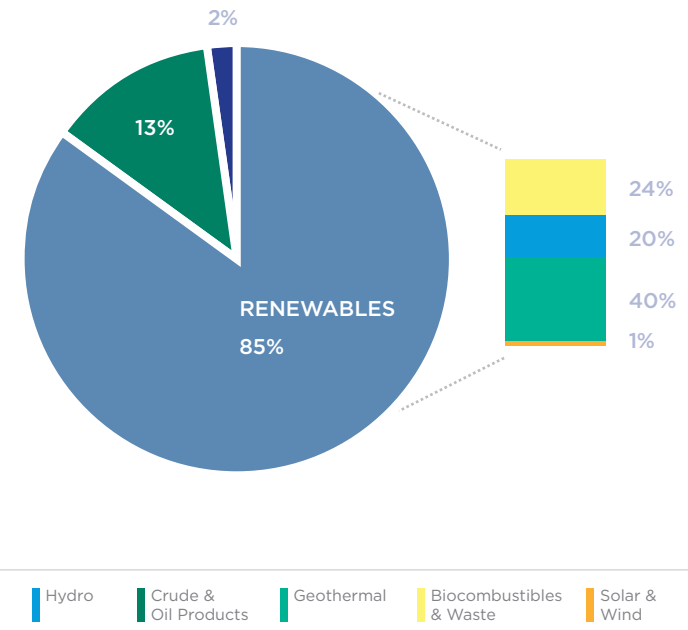
Primary energy trade balance

In 2009, Costa Rica imported 8.1mbd of crude oil, which, with changes in inventory, resulted in 7.8 mbd of primary energy supply in the country. These imports were carried out by the [National Oil Refinery \(Recope\)](#), which has a monopoly on importation, refining, transportation, distribution and sale of derivative products. [Recope](#) has a nominal refining capacity of 25 thousand barrels per day in Moín plant on the Caribbean coast of the country, inaugurated in 1967. Imports of crude dropped to 38% during the 2005-2008 period and moved from 92% of imports of primary energy to 85%. The remaining 15% was from coal purchases, which totaled 1.4 kboe/day.

Internal supply of primary energy

With imports of crude and primary energy production, mainly renewable, the Primary Energy Supply (PES) in 2009 totaled 63.9 kboe/day, a statistic slightly below the average between 2005 and 2008 of 65.2 kboe/day.

PRIMARY ENERGY SUPPLY



Source: Own Calculations based on IEA Energy World Balances

The PES of 2009 was composed of 85% renewable sources, a pattern that is held by almost all the countries in the region. Costa Rica is known for its high use of geothermal energy (40% of the PES), its wind and solar infrastructure (1% of the PES), as well as its relatively low use of biofuels from firewood and cane products in comparison with other countries in the region, which are only 24% of the PES.

Electricity

Installed capacity

The Costa Rican electricity generation infrastructure is highly oriented to renewable sources. This represents 75% of the installed capacity in the country, with 1870 MW in 2009, of which 1530 MW were generated in hydroelectric plants and 340 MW in geothermal and wind plants. The remaining 620 came from thermoelectric plants, which have doubled their installed capacity since 2000.

Installed Capacity (MW)	2000	2005	2009
Total Renewables	1414	1594	1872
Hydroelectric	1225	1304	1532
Non-hydroelectric	189	290	340
Thermoelectric	294	423	618
Total	1708	2017	2490

Source: U.S. EIA

It is important to note that the installed capacity for electricity generation in Costa Rica has grown from 1710 MW to 2490 MW, about 45%, in the nine years between 2000 and 2009. This growth in capacity can be explained by the rise in thermoelectric capacity, which doubled, and by geothermal and wind plants, which almost doubled in nine years, passing from 190 MW to 340 MW.

Input to electricity generation

The inputs for electricity generation – the energy consumed to generate electricity – totaled almost 35 kboe/day during 2009, a growth of almost 7% above the previous total. Representing most of the installed capacity, renewable sources also are the main source of consumption generated, with 93% of the inputs during 2009, increasing its share from the 91% of consumption generated that it represented between 2005 and 2008. This increase in renewables was made at the cost of liquid fuels, which fell from 9% to 7% and totaled 2.4 kboe/day during 2009.

Costa Rica	2005-2008		2009	
Total inputs for generation (kboe/day)	32.7	100%	34.9	100%
Oil Products	3.1	9%	2.4	7%
Renewables	29.6	91%	32.5	93%

Renewables include hydro and combustibles renewables & waste.
Source: Own Calculations based on IEA Energy World Balances

Electricity matrix

From the inputs described above, the Costa Rican generation infrastructure produced the 9,290 GWh that were consumed during 2009, equivalent to 14.3 kboe/day. This represents only 40% of the inputs due to the low efficiency rates of geothermal and thermoelectric sources. In fact, although this was the second source for consumption

generated, hydraulic energy was the main source of electricity consumed in the country, with 7225 GWh and almost 80% of the generation due to its high efficiency. No other source contributed more than 2000 GWh, and only geothermal passed more than a thousand gigawatt hours, with 1,186 GWh.

Secondary balance and consumption

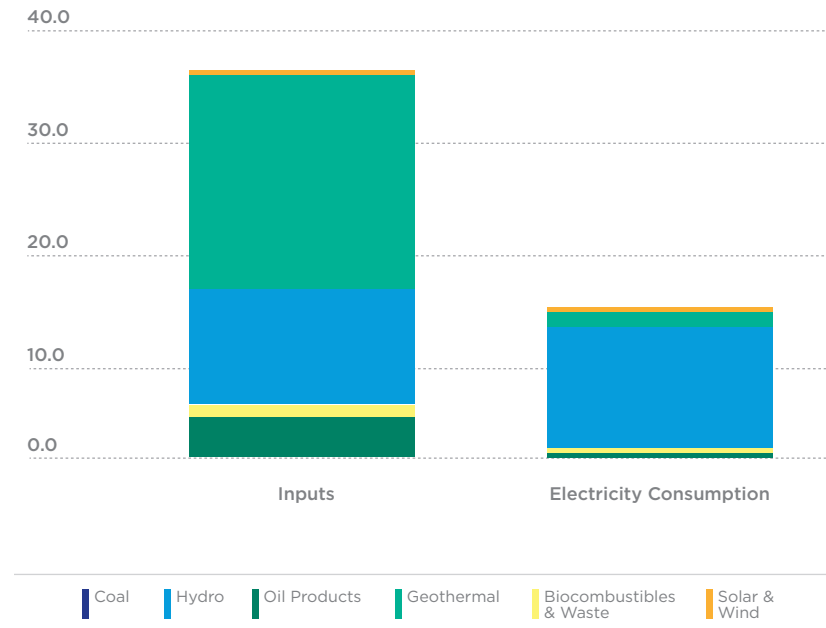
Secondary energy balance

Totaling 40 thousand barrels per day, imports of liquid fuels represented an important energy source in Costa Rica during 2009. These imports were made by Recope, which, as described above, is also responsible for the distribution and sale of these products. Also, there were small electricity imports, reaching 300 barrels of equivalent per day.

Final consumption by sector

The transportation sector had the highest energy consumption during 2009 with almost 30 kboe/day – 43% of final consumption – which was fully integrated with liquid fuels. The importance of the transportation sector maintains the same pattern of consumption during the decade in Costa Rica. Industrial consumption was in second place, consuming almost 18 kboe/day, of which 52% were biofuels, 27% derivatives and 17% electricity. Lagging behind was commercial consumption with 6.1 kboe/day – 81% of which was electricity – and the consumption of other sectors, 81% dependent on liquid fuels.

ELECTRICITY GENERATION MATRIX (KBOE/DAY)



Source: Own Calculations based on IEA Energy World Balances



Institutional Organization of the Energy Sector

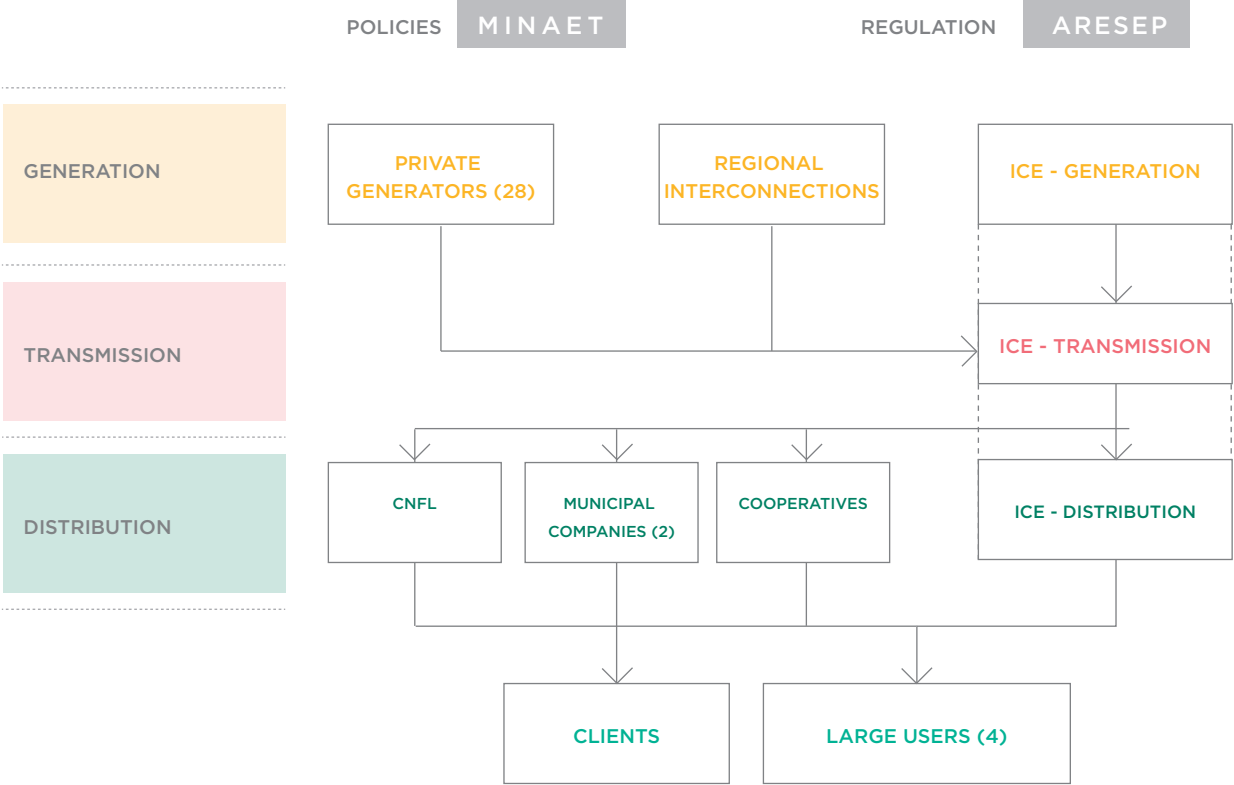
Institutional Structure

The energy sector in Costa Rica is composed of four main actors: the [National Ministry of Environment, Energy and Telecommunications \(Minaet\)](#), which acts to create policies; the [Regulatory Authority for Public Services \(Aresep\)](#) that is responsible for controlling all sector activities; the [Costa Rican Electricity Institute \(ICE\)](#), a state owned business that is vertically integrated and is the most important actor in the electricity subsector; and the [Costa Rican Oil Refinery \(Recope\)](#) which handles the monopoly of importing, exporting, refining and wholesale distribution of oil in the country.

Private sector participation in the energy sector is limited. In the electricity subsector, for example, it manages around 20% of the national generation capacity and in the hydrocarbon subsector it is limited to the retail distribution of petroleum derivatives.

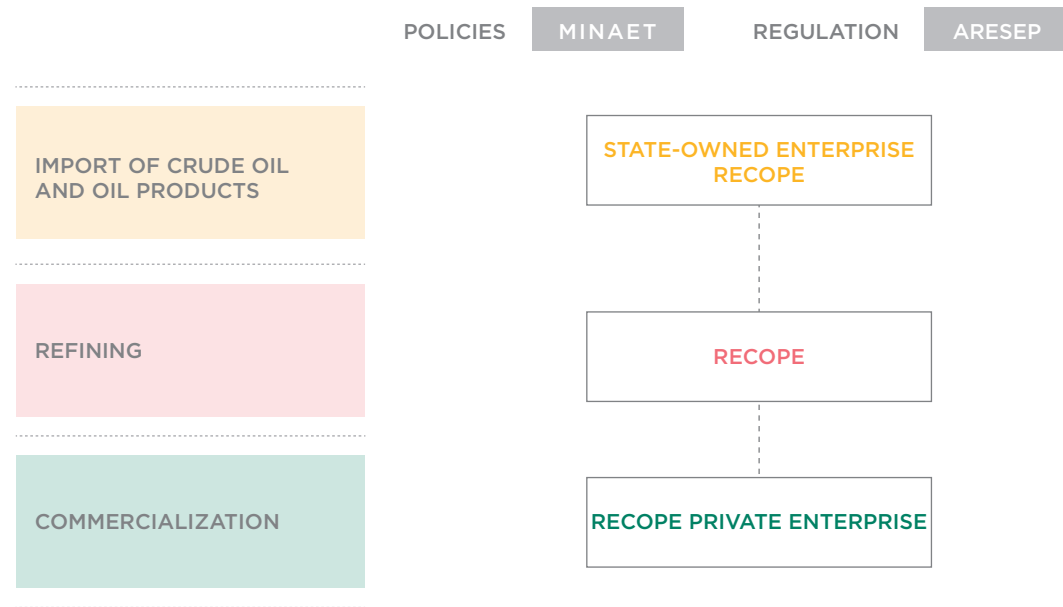
Costa Rica and Honduras were the only countries of the Central American isthmus to maintain state control with vertically integrated electricity companies during the 90s, which in other countries was characterized by a strong impetus for private sector participation. Since then, the structure of the electricity subsector in Costa Rica has been relatively stable: a tight control of private enterprise in all sectors of the electricity business and the presence of a vertically integrated autonomous state institution in a dominant position. A similar structure was established in the hydrocarbon subsector in 1993 with the creation of the monopoly by the state company Recope for the majority of activities related to fossil fuels.

Electricity sub-sector structure in Costa Rica, 1990



Source: Author's work based on ICE, Aresep, Minaet and regulatory framework

Institutional Structure of the Hydrocarbon Sub-Sector, 2011



Source: Author's work based on ICE, Aresep, Minaet and regulatory framework

Policy formulation for the energy sector

The [National Ministry of Environment, Energy and Telecommunications \(Minaet\)](#) is the organization of executive power in charge of designing and planning the energy policies in both the electricity, via the Energy Sector Directorate, and the hydrocarbon sector, via the Hydrocarbon Sector Directorate and the General Directorate of Transportation and Fuel Marketing.

The Minaet is responsible for the development of the National Energy Plan (PNE), the formulation of price policies, keeping adequate information on the planning and development of the energy sector updated and promoting the rational use of energy.

Regulator

The [Regulatory Authority for Public Services \(Aresep\)](#) is the agency responsible for monitoring the compliance with rules for electricity service in all its stages, as well as those related to fossil fuels (refining, transportation, distribution and marketing). Its board consists of five members named by the Governing Council and approved by the Legislative Assembly to serve for a period of six years with the potential to renew for a similar period. This period coincides with the presidential period.

[The Aresep](#) is an institution with a legal character and its own funding. To finance itself, it charges a fee for regulatory services rendered and receives funds from the national budget..

Matriz Institucional sub-sector eléctrico en Costa Rica

Generation		Transmission		Distribution	
	Installed Capacity	Company	I. C. E.		I. C. E. (40%) C. N. F. L. (40%) Municipal companies (27.8%) Cooperatives (8%)
Hydroelectric	59.6%	Ownership	State-Owned	Companies ⁷	
Solar & Wind	4.6%	Market	Monopoly		
Thermoelectric	29.4%	Functions	Operate the integrated national system Integrated operation Energy purchases		
Geothermal	6.4%			National coverage. ⁸	99.20%
Main State-Owned Company	I. C. E. (69.4%) ¹	Pricing policy	Toll reflected on distribution policy	Market	Regional monopolies
Private Participation	Allowed	Private participation?	No	State-owned company	I. C. E., C. N. F. L.
Requirements	Múltiple ²	Retailers	n.a.	Private participation?	Restricted
Registrations	29 plants (18.1%) ³	Large consumers	n.a.	Concessions	Tendering (20-25 years)
Vertical integration	Partially permitted ⁴	Max demand	n.a.	Subsidized users?	Not present in legislation
Fiscal Incentives⁵				Pricing policy	Regulated
(a) Equipment	No import taxes	Regulating Authority for Public Services (ARESEP)			
(b) Fuels	n/a	5			
(c) Small generators	Under analysis ⁶	Named by the executive branch and approved by the Legislative Assembly			
Regulator		Fee for regulated service to interested parties + funds from the national budget			
Members of the board					
Appointment					
Financing					

Source: Author's work based on CEPAL, Aresep, ICE, CNFL, Law 7200 modifications and regulations, Law 8345

Electricity subsector

The electricity subsector in Costa Rica is characterized by the strong presence of the State in all its stages. The main agency is the [Costa Rican Electricity Institute \(ICE\)](#), a vertically integrated autonomous state company that manages around 80% of the generation capacity of the country, all of the transmissions networks and around 40% of the distribution in national territory. This last sector, its subsidiary, the [National Power and Light Company \(CNFL\)](#) serves the capital region. Together the ICE-CNFL handle around 80% of the distribution of energy on a national level. In addition, the [ICE](#) participates as the sole authorized agent in the Regional Electricity Market¹ These characteristics make the [ICE](#) a dominant player in all stages of the electricity business.

The [ICE](#), in operation since 1949, is responsible for the management of hydraulic and geothermal resources as well as planning for the expansion and operation of the national transmission system. It finances its operations through revenues collected from service fees established by the [Aresep](#).

Generation

In 2010 the Costa Rican generation park had an installed capacity of 2605.3 M, the highest of the Central American isthmus. Two features stand out in its composition: first, 71% of the total power is generated from primary renewable sources (60% hydraulic, 5% wind and 6% from geothermal), second, 82% of installed power is managed

¹ WIn reality Costa Rica is interconnected with Nicaragua and Panama.

by public companies. Table 1 illustrates the installed capacity composition in Costa Rica by source, distinguishing between public and private sector.

Table 1. Distribution of electricity generation capacity in Costa Rica, 2010

Sources	Public	Private	Total
Primary			
Hydro	51.8%	7.8%	59.6%
Geothermal	5.2%	1.1%	6.4%
Wind	0.8%	3.8%	4.6%
Secondary			
Thermal	24.1%	5.4%	29.4%
Total	81.9%	18.1%	100%

Source: CEPAL and own calculations

As was mentioned earlier, private sector participation in the electricity subsector is limited. It handles 18.1% of the installed capacity on a national level, the lowest percentage in Central America. The incorporation of private companies into the generation sector is allowed in two ways: via autonomous or parallel generation, incorporated by the 1990 Law 7200 and generation under generation in system competition, including the first modification to Law 7200 made in 1995 (Law 7508). The main features of both methods are described below:

- (a) Autonomous or parallel generation,² with the following characteristics and/or legal restrictions:
- They cannot exceed the generation capacity of twenty thousand kilowatts (20,000 KW.).
 - The period for concessions is 20 years, renewable for a similar period.³
 - The concept of parallel power generation cannot be more than 15% of the power in the whole National Electricity System.
 - 35% of social capital must be owned by Costa Ricans.
 - Must include a study on environmental impact in order to get the concession.
 - It allows vertical integration.⁴
- (b) Generation under a competitive system,⁵with the following characteristics and/or legal restrictions:
- It is only allowed for non-conventional sources.⁶
 - They cannot exceed a generation capacity of 50,000 kilowatts (KW).
 - The period for grants is 20 years.
 - Power that comes from generation via competition cannot constitute more than 30% of the total power for the National Electricity
 - 35% of the social capital must be owned by Costa Ricans.
 - Must include an environmental impact study.
 - Must sell their entire production of ICE.

² Frequently found in literature under the English acronym BOO which means Build-Own-Operate.

³ In the case of hydroelectric plants the period is 25 years. Law 8723.

⁴ Cooperatives and municipal utilities that generate, distribute and market power in this fashion can sell energy to users located within their geographic coverage area. The surplus from these companies can be sold to ICE or among the companies themselves. Those not include in this category should sell energy exclusively to ICE.

⁵ Found in literature under the English acronym BOT, which means Build-Operate-Transfer.

⁶ Conventional sources are those that use the process of hydrocarbon generation, coal or water.

In 2010 there were 29 generation plants in the hands of private capital. Most of these plants are registered with the [Costa Rican Association of Power Producers \(ACOPE\)](#). Other important players in the sector include municipal public utilities companies and cooperative associations, all with the capacity to provide distribution and generation⁷ services and generation in zones of their area of operation. In Costa Rica there is no wholesale electricity market. The only energy buyer of privately produced energy is ICE.⁸ Electricity prices for sales in blocks and electricity rates to final consumers are regulated by Arsep using the criteria of service at cost, which consists in recovering the costs of operation, maintenance, depreciation and a “reasonable” rate of return on the asset. Arsep must approve this rate.

For private generation plants with a capacity less than 20 MW, the ICE uses the criteria of service cost to fix the purchase price of energy. The criteria were used for these companies until 2009 when it was replaced by a different criteria called “avoided cost,” which calculated the marginal cost of the ICE over the long term. However, Law 8723 in 2009 established that the reference to be used was cost criteria.

The purchase price of energy by the ICE for renewable generation with a capacity no greater than 50 MW was established as a result of the public bidding process previously authorized by the regulator (Arsep) and, in all cases, it should not be greater than the marginal cost of generating a kWh in the stage where there is no generation by private producers.⁹ These types of contracts last a maximum of 20 years.

⁷ Subject to restrictions.

⁸ With the exception that we made for the case of municipal service companies and cooperative associations.

⁹ Article 20-26 Executive Decree 2346. Regulation to the Law that authorizes autonomous or parallel generation.

Transmission

The energy sales made by [ICE-Generation](#) to [ICE-Transmission](#), [CNFL](#), other distributors and direct users include a charge for power (KW) and a charge for energy (KWh), differentiating in both cases three scheduled moments: high point (greatest demand), valley and night. In addition, these participants are charged a fee for the service of transmission that is fixed and regulated by Aresep.

In addition, [ICE](#) is responsible for the planning, expansion and operation of the national transmission system. It stretches from the border with Nicaragua to the border with Panama. At present it has 1083 Km of transmission lines of 230 kV and 727 km of 138 kV.

Power transmission is under the exclusive control of the [ICE](#), which also serves as the sole authorized agent in the Regional Electricity Market. The operation of the Electricity System is centralized under the responsibility of the Energy Control Center of the [ICE](#).

Distribution

Regarding the distribution sector, the distribution and commercialization of electricity in Costa Rica is the responsibility of eight utility companies. These companies are the [ICE](#) and its subsidiary, the [National Power and Light Company \(CNFL\)](#), to municipal companies¹⁰ and four rural electrification cooperatives.^{11 12}

¹⁰ Herida Utility Company (ESPH) and Cartago Electric Service Administration Board.

¹¹ Cooperguanacaste, Coopelesca and Coopealfaro Coopesandos, responsible for localities in Guanacaste, San Carlos, Los Santos and Alfarero Ruiz respectively.

¹² See Law 8345 13.

The latter operate as small regional monopolies, distribute 20% of the national demand and handle approximately 10% of national power. The existing legal framework seeks to encourage distribution companies to invest in new generation capacity to meet the demand of its clients.¹³ It also facilitates obtaining water concessions for hydroelectric power.

As mentioned above, electricity prices both for block sales and for end consumer rates are regulated by the [Aressep](#) using service cost criteria. Current legislation does not establish any type of explicit subsidy for any sector of the population. However, there are implicit and crossed subsidies.

Regional Electricity Market

Although the infrastructure necessary for its existence and operation in a regional electricity market is available, the regional market is not operating at its full potential. The main barriers relate primarily to political and regulatory issues.

In the particular case of Costa Rica, the effective deepening of Regional Electricity Market (MER) would allow it to maintain its development policies with clean energy in the country and to stock thermal plants in other cases, in the event that such action was needed. On the other hand, there are hydroelectric projects that, given their size alone, would be economically viable if there was a way to effectively integrate energy.

¹³ Under BOO system restrictions.

The main barriers found in the country are summarized below:

- Lack of market regulatory coordination between the national and regional market, in particular those related to system safety and reliability.
- Limits on the participation of other agents aside from ICE in international transactions. Delays in approving the protocol II to the MER Treaty Framework.
- Must complete the creation of independent business units and grant independence and autonomy to the control centerda

Hydrocarbon Sub-Sector Institutional Matrix, 2011

Transport / Refining		Retail	
Private participation	No	Private participation	Yes
Requirements	n/a	Requirements	
Environmental	Yes	Environmental	Yes
Concessions	No	Concessions	
Prices		Companies	
Transport of oil products	Regulated	Oil products	ELF Costa Rica, Texaco (6%), Total (4%), Shell (10%), Independientes (21%), ACEC (59%)
State-owned company	RECOPE	LPG	Tropigas (36%), Zeta Gas (37%), Tomza (9%), Super Gas (9%), PetroGas (9%)
Functions	Monopoly of information, refining, transport and wholesale of crude, oil products and LPG.	Prices	Regulated
Registered companies	1	Oil products	Import price (60%), wholesalie margin (9%), retail margin (6%), taxes (2.5%)
		LNG	Imports (57%), Wholesale (14%), Retail (21%), Taxes (8%)
Regulator		Regulating Authority for Public Services (ARESEP)	
Members on the board		5	
Appointment		Appointed by the executive power and approved by the Legislative Assembly	
Budget		Fee for regulated service to interested parties + funds from the national budget	

Source: Author's work based on Aresep and Recope

Hydrocarbon subsector

The Directorate General of Hydrocarbons (DGH) belongs to [Minaet](#) and is currently responsible for carrying out and directing policies related to the exploration and exploitation of hydrocarbons in Costa Rica. Since 2002, however, all the activities of the sector upstream water of the hydrocarbon business are suspended.

This means that all the hydrocarbons consumed in Costa Rica are imported under the sole responsibility of the [Recope](#) company, which is in charge of the monopoly of import activities, refining, transportation and the wholesale distribution of fuel, asphalt, petrol and GLP. Local fuel prices, regulated by [Arsep](#), cover the costs of import, the wholesale marketing margin of [Recope](#) (including storage) and local taxes.

Costa Rica has a nominal refining capacity of 25 thousand barrels per day, and crude imported by [Recope](#) is used in its entirety for the refinery. The main derivative imports are concentrated in gasoline and diesel. [Arsep](#) fixed the fuel prices that [Recope](#) sold to distributors. Wholesale distribution activity was officially permitted after the enactment of Law 7356, known as the Monopoly Law.

Historic Development of the Energy Sector



Evolution of the Energy Matrix 1971 - 2008



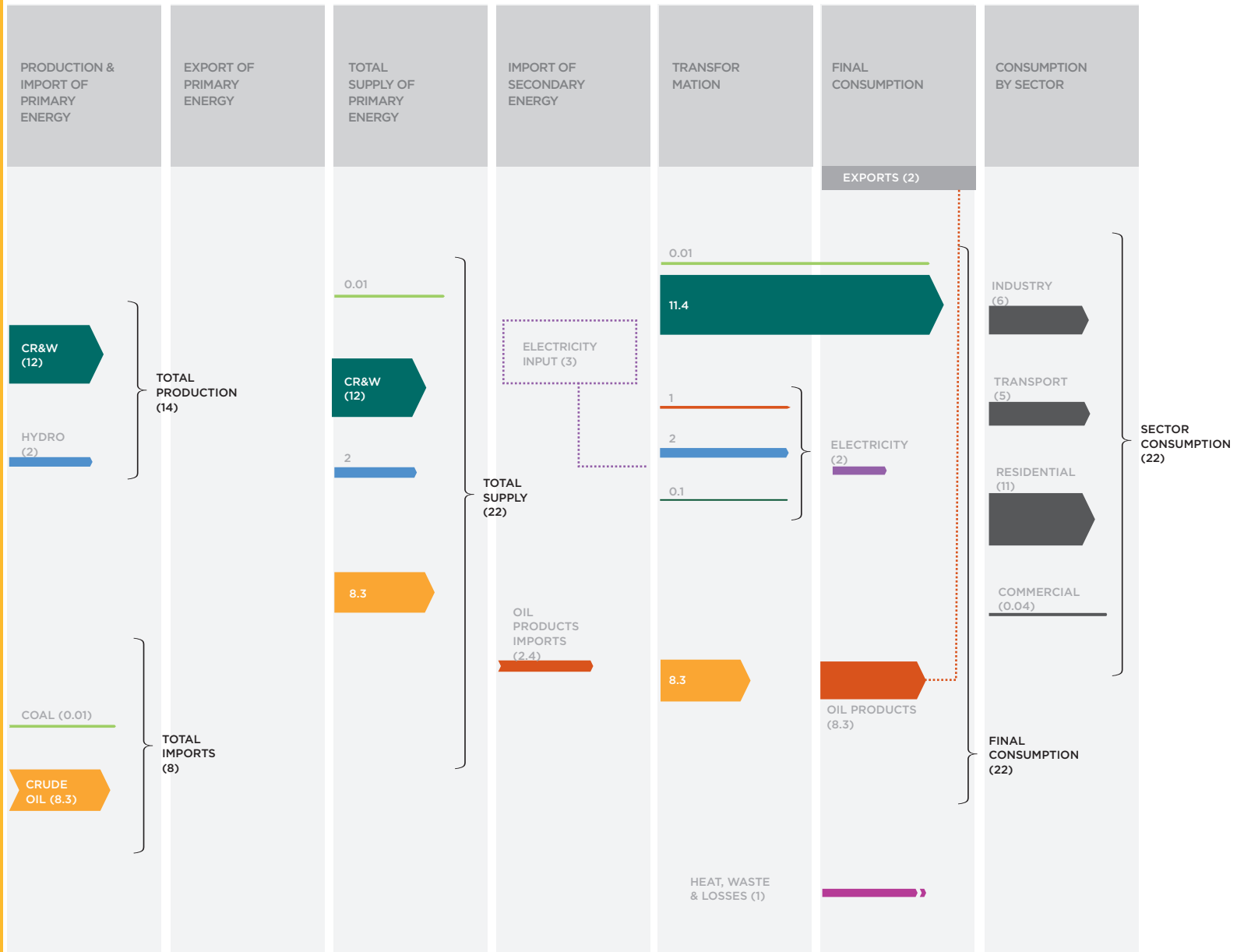
1971-1974

The energy balance in Costa Rica favors the use of renewable fuels and residential consumption during this period. The country also imported significant amounts of crude oil that was refined for transportation and industrial consumption as well as for electricity generation. In this last aspect, it is also important to note its consumption of hydraulic energy.

1971-1974

Energy Flow

(kboe/day)



Total Energy Consumption

In the early 70s, the Costa Rican economy consumed 24.5 kboe/day of energy, mainly from two sources: biofuels and imported crude. The first totaled 48% of the TEC with almost 12 kboe/day made up of 80% firewood. Crude imports reached more than 8 mbd, which represented 34% of total energy consumption during this period. Oil was processed in the only refinery in the country, which was founded in 1961 with private capital. The third energy source, much smaller than biofuels and crude, was imports of petroleum products. This consumption reached 2.4 kboe/day, which represented 10% of the TEC. At a slightly lower level than petroleum products was hydrogeneration use. This reached almost 2 kboe/day and represented 8% of the total energy consumption during the period. Hydropower production between 1971 and 1974 came from the following hydroelectric centers: La Garita, opened in 1958 with 135 MW of installed capacity; Río Macho which opened in

1963 with 30 MW and was expanded in 1972 and 1978 to bring it to a capacity of 120 MW; and Cachí, which began to operate in 1966 with 32 MW of capacity and later was expanded in 1967 and 1978 to 101 MW. They also imported small quantities of coal for industrial consumption – 0.1 kboe/day, 1% of the TEC.

Electricity

Costa Rica is distinguished by the use of hydropower as a main source of electricity generation since 1971. 66% of consumption comes from hydrogeneration, almost 2 kboe/day. A third came from the consumption of derivatives, almost 1 kboe/day, while 0.05 kboe/day of biofuels were consumed to generate electricity. Thus 86% of the 1,307.5 GWh were generated from hydraulic energy, 13% from derivatives and 1% from biofuels.

Electricity	Inputs (kboe/day)	%	Electricity consumption (GWh)	Electricity consumption (kboe/day)	%
Oil products	0.97	33%	173.50	0.26	13%
Hydro	1.95	66%	1,126.25	1.69	86%
Biocombustibles	0.05	1%	7.75	0.01	1%
Total	2.97	100%	1,307.50	1.96	100%

Source: Own Calculations based on IEA Energy World Balances

Final Consumption by Sector

Like almost the whole region, at the beginning of the 70s residential consumption accounted for the majority of Costa Rican energy use with 10.5 kboe/day - 49% of the total- composed of 82% biofuels (firewood for rural consumption) and 12% of electricity. Industry and transportation each consumed around 25% of the sector total. Industrial consumption was 50% biofuels, 39% derivatives and 11% electricity while transportation only used derivative products.

Consumption by sectors	Industry	Transport	Residential	Commercial	Others
Coal	0.2	0	0	0	0
Oil products	38.9	100	5.6	0	100
Biocombustibles	50.0	0	82.1	0	0
Electricity	10.9	0	12.3	100	0
Total	100%	100%	100%	100%	100%

Source: Own Calculations based on IEA Energy World Balances

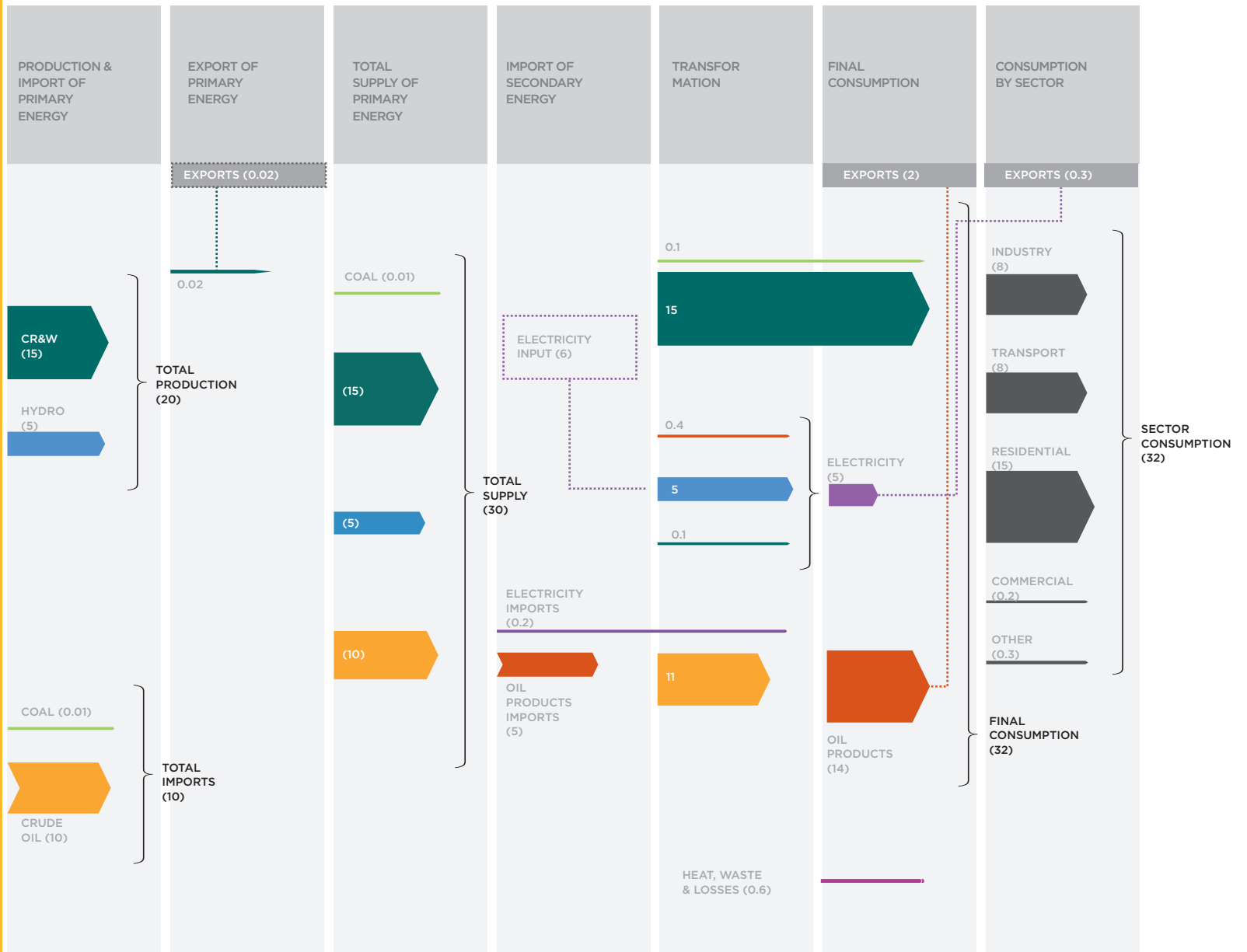


1984-1987

By the mid eighties Costa Rica reduced its energy use from bio-fuels, increased its consumption of hydraulic energy and began to import greater quantities of derivative products. All of this occurred as the country urbanized and modernized and increased automobile transportation. Even so, sector consumption remained tilted towards residential use as the first sector of final energy demand.

Energy Flow 1984-1987

(kboe/day)



Source: Own Calculations based on IEA Energy World Balances

Total Energy Consumption

Although biofuel consumption in Costa Rica remained the main energy source with 42% and 15 kboe/day, its absolute consumption and especially relative consumption fell in comparison to the previous period. It is important to note that between 1971 and 1974 the consumption of biofuels was 48% of the TEC with 12 kboe/day. This decline in relative importance owes itself to two main reasons: the increase in the import of derivative products that, with 5.3 kboe/day, moved from 10% to 15% of the total consumption of the period, and represented an increase of 116% over the total imported at the beginning of the 70s; and the 160% growth that hydraulic energy consumption experienced thanks to the incorporation of large hydroelectric plants between the previous period and this one. In 1979 the Arenal plant began operations with 157 MW of installed capacity and in 1982 Corobicí was inaugurated. It is

currently the largest plant in Costa Rica with 174 MW of capacity. Crude oil imports increased 23% to reach 10-15 mbd and represent 29% of total consumption, 5 points below the 34% that it represented between 1971 and 1974. It is important to note that the refinery [RECOPE](#) was nationalized in 1975 after the process of buying [Allied Chemical](#) company, which opened in 1972. Finally, imports of carbon continued contributing 1% to consumption, after a slight decline of 0.003 kboe/day..

Electricity

With the surge in hydraulic energy, it met 92% of the consumption of electricity generation with 5 kboe/day. Liquid combustibles and biofuels came in far behind with 7% and 1% of generated consumption respectively. Hydrogeneration accounts for 97% of the 2,991.75 GWh generated during this period, 2% from derivatives and 1% from biofuels.

Electricity	Inputs (kboe/day)	%	Electricity consumption (GWh)	Electricity consumption (kboe/day)	%
Oil products	0.36	7%	68.50	0.11	2%
Hydro	5.03	92%	2912.75	4.49	97%
Biocombustibles	0.07	1%	10.00	0.02	0%
Total	5.46	100%	2,991.25	4.61	100%

Source: Own Calculations based on IEA Energy World Balances

Final Consumption by Sectors

Once again, residential consumption represented by far the greatest share of Costa Rican energy consumption with 47% of the total and almost 15 kboe/day, composed of 76% biofuels and 21% electricity. The industrial and transport sectors returned to each consuming 25% of the total, the first, with 43%, was biofuels and 40% derivatives, while in second followed the consumption of only derivative products.

Consumption by sectors	Industry	Transport	Residential	Commercial	Others
Coal	0.2	0	0	0	0
Oil products	39.9	100	3.3	0	100
Biocombustibles	43.0	0	75.7	0	0
Electricity	17.0	0	21.0	100	0
Total	100%	100%	100%	100%	100%

Source: Own Calculations based on IEA Energy World Balances

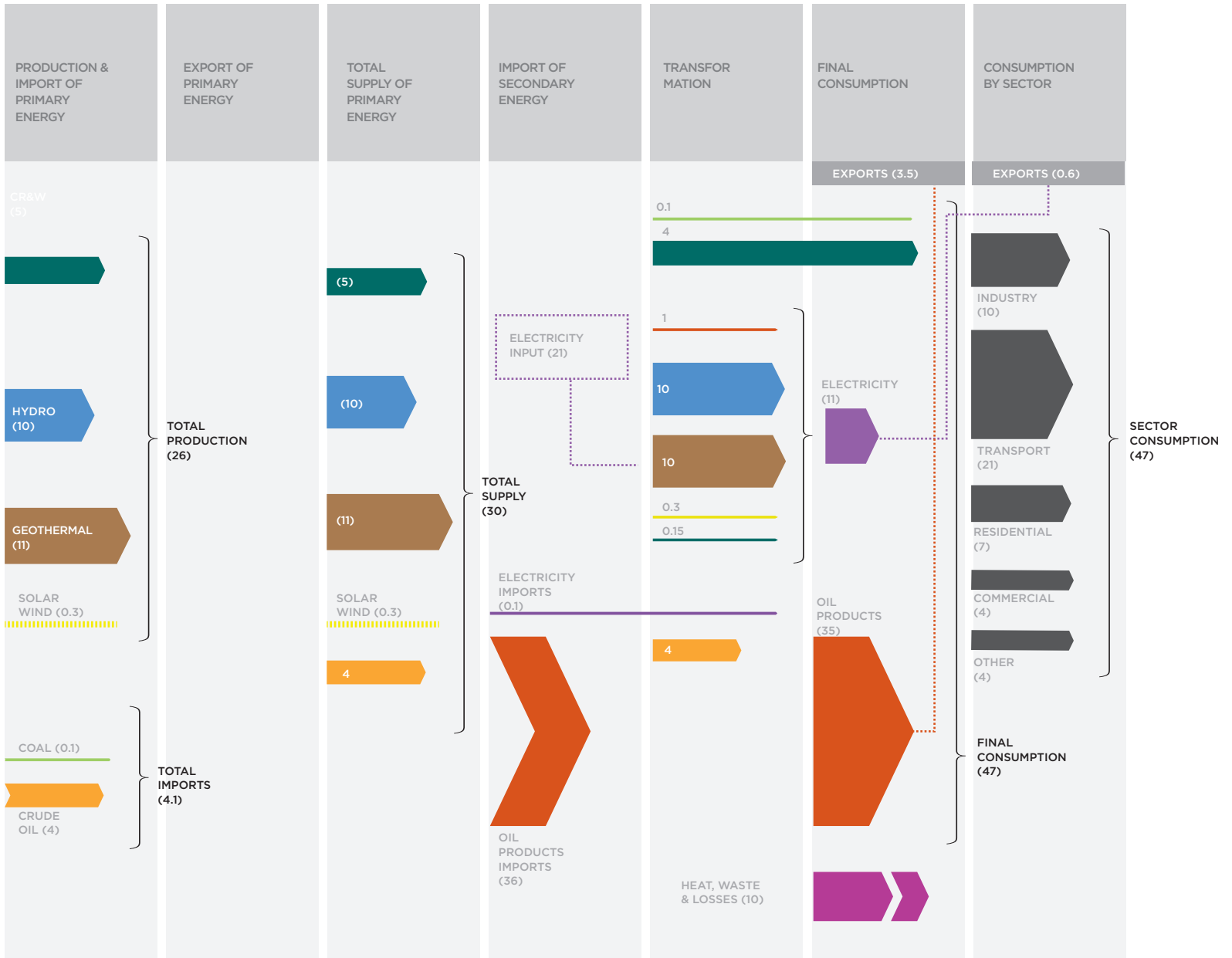


1999-2002

The Costa Rican matrix experienced important changes between 1987 and 1999-2002. During these years it incorporated geothermal energy and doubled hydroelectric generation and imports of petroleum products increased by a factor of six. Total energy consumption grew 86% and totaled 66 kboe/day at the beginning of the twenty first century.

Energy Flow 1999-2002

(kboe/day)



Source: Own Calculations based on IEA Energy World Balances

Total Energy Consumption

Although exploration for geothermal energy began in 1970, its development began in 1994 when electricity was generated from a well in the Miravalles field. During the decade of the 90s the development of geothermal continued, and for this analytic period consumption from this source was almost 11 kboe/day, putting geothermal in second place in terms of consumption with 16% of the TEC. In 1987 Costa Rica imported about 11 kboe/day, falling during this period to only 4 mbd. This decline can be explained by the suspension in operation at Recope between 1998 and 2000 due to the reduction in operation at the refinery, which was subject to a process of improvements. Thus, the import of crude oil fell from 29% to 7% of the TEC. In part due to this reduction, imports of derivative products grew almost six times and thus represented the largest source of energy consumption with 55% of the TEC. In renewables, according to the [International Energy Agency \(IEA\)](#) consumption of firewood fell almost 70% to total 4.7 kboe/day, due to both the urbanization of the country and the intense policies of rural electrification. Moreover, hydro-

power energy consumption grew from 5 to 9.6 kboe/day thanks to the incorporation of new hydroelectric plants. In 1990 the Alberto Echangi plant opened with 4.7 MW of installed capacity, followed by Sandilal (32 MW in 1992). Two plants on the Toro River were also inaugurated: Toro I (23 MW in 1995) and Toro II (66 MW in 1996). In 2000 Angostura was inaugurated (172 MW) followed by Peñas Blancas (38 MW) in 2002.

Electricity

During this period the electricity sector recorded significant growth in generated consumption and electricity generated by the incorporation of geothermal energy and the rebound of hydraulic energy. The generated consumption totaled almost 21 kboe/day, composed 48% of geothermal and 46% of hydraulic energy, which fell from 92%. From this consumption, 6,842.25 GWh was generated - more than double the previous total - integrated with hydrogeneration by 81%, 14% bio-fuels and 3% by geothermal. This composition highlights the massive energy loss in the process of geothermal energy generation.

Electricity	Inputs (kboe/day)	%	Electricity consumption (GWh)	Electricity consumption (kboe/day)	%
Biocombustibles	0.71	3%	103.50	0.16	2%
Hydro	9.61	46%	5,562.50	8.40	81%
Biocombustibles	0.16	1%	971.75	1.47	14%
Geothermal	9.89	48%	182.00	0.27	3%
Solar, Wind & Others	0.31	2%	22.50	0.03	0%
Total	20.67	100	6,842.25	10.33	100

Source: Own Calculations based on IEA Energy World Balances

Final Consumption by Sector

The composition of consumption by sector changed dramatically with the 154% growth experienced in the transportation sector that made it the greatest energy consumer with 21 kboe/day, all from derivatives and covering 46% of the total. This was a consequence of the process of modernization in the country, the significant increase in per capita income and the development of transportation infrastructure. It was followed by the industrial sector with 10 kboe/day and 22% of the total. The residential sector fell to third place, representing 15%, while the commercial sector and other sectors grew significantly and together totaled 17% with more than 8 kboe/day.

Consumption by sectors	Industry	Transport	Residential	Commercial	Others
Coal	0.5	0	0	0	0.0
Oil products	47.1	100	15.4	19.7	98.5
Liquid Fuels	28.5	0	21.1	0.0	0
Electricity	24.0	0	63.5	80.3	1.5
Total	100%	100%	100%	100%	100%

Source: Own calculations based on IEA Energy World Balances

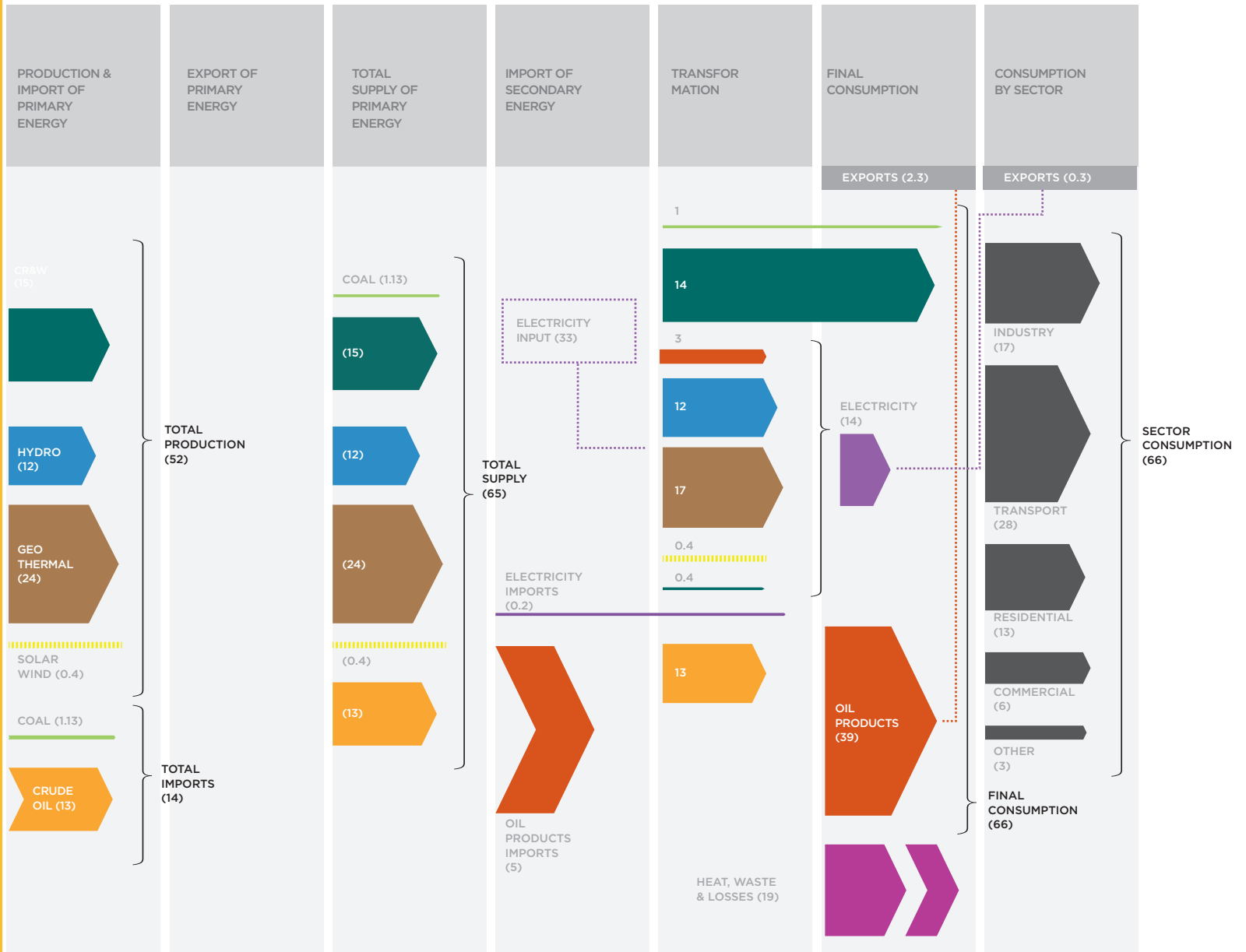


2005-2008

During this period it is important to note the growth of geothermal energy, the recovery of crude oil imports and the larger scale incorporation of coal and wind energy into the Costa Rican matrix. The process of diversification of the Costa Rican energy portfolio is evident.

Energy Flow 2005-2008

(kboe/day)



Source: Own Calculations based on IEA Energy World Balances

Total Energy Consumption

Improvements in the refinery were completed in 2000 and crude oil imports returned to their historic levels, around 13 mbd, 13% of the TEC, which totaled 98 kboe/day. With this recovery in refining capacity, imports of derivative products fell slightly to 35 kboe/day – although they continued being the largest energy source of the TEC with 34%. Geothermal continued growing with the incorporation of units 3 and 5 in Miravalles, a plant that during this period already met 25% of primary energy consumption with 24 kboe/day. Consumption of biofuels rebounded to represent 15% of the TEC with 15 kboe/day. With the addition of the Cariblanco hydroelectric plants in 2008 with 80 MW and La Joya with 50 MW in 2006, hydraulic energy grew 23% and reached almost 12 kboe/day – 22% of consumption. During this period two important sources began to be incorporated: coal and wind energy. While Costa Rica imported small quantities of coal since the beginning of the analysis, during this period imports totaled 1.1 kboe/day, 1% of the TEC. Consumption of wind energy was

incorporated at the beginning of the decade and between 2005-2008 totaled 0.4 kboe/day, from the wind parks Tilará (19.8 MW, inaugurated in 1996), Molinos Viento del Arenal (24 MW, 1997), Aeroenergía (6.75MW, 1998), Tejona (19.8 MW, 2002), and Western Lake Arenal (23 MW, 2005).

Electricity

Generated consumption at the end of late 2000 grew by 50% in comparison with the beginning of this period thanks to the increase in geothermal consumption, which, with 17 kboe/day represented 52% of generated consumption. The hydroelectric plants, with 12 kboe/day represented 36%, followed with a lag by derivatives with 9% and biofuels and wind with 1% each. From these 31 kboe/day that were consumed in the process of transformation, 8,869 GWh were generated, of which 77% were from hydrogeneration, 13% geothermal, 6% derivatives, 3% from wind energy and 1% from biofuels.

Electricity	Inputs (kboe/day)	%	Electricity consumption (GWh)	Electricity consumption (kboe/day)	%
Liquid Fuels	3.06	9%	550.75	0.85	6%
Hydro	11.80	36%	6,830.75	10.59	77%
Biocombustibles	0.38	1%	74.75	0.12	1%
Geothermal	17.11	52%	1,183.25	1.83	13%
Solar, Wind & Others	0.40	1%	229.25	0.36	3%
Total	32.74	100%	8,868.75	13.75	100%

Source: Own Calculations based on IEA Energy World Balances

Final Consumption by Sector

Consumption by sector did not reflect major changes from the previous period. Transportation consumption remained the same as the most important source with 42% of the total and almost 28 kboe/day from derivatives, while industrial consumption was in second place with 17 kboe/day – 26% of the total – composed of 45% biofuels, 31% derivatives and 20% electricity. Residential use was in third place with a total of 13 kboe/day and 19% of the total.

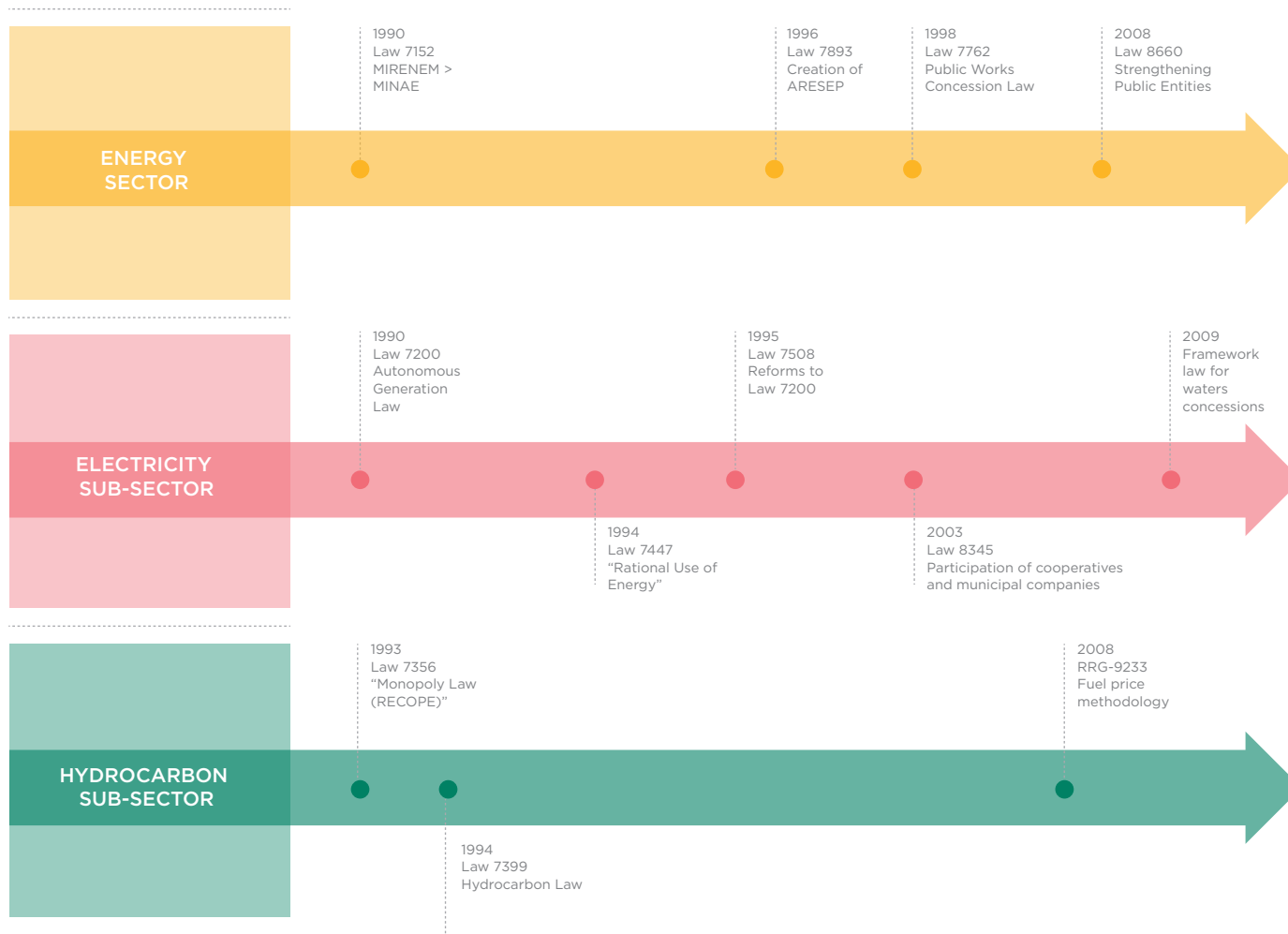
Consumption by sectors	Industry	Transport	Residential	Commercial	Others
Coal	3.7	0	0	0	0.2
Oil products	31.2	100	7.0	14.9	81.6
Liquid Fuels	45.1	0	49.2	6.9	0
Electricity	20.0	0	43.7	78.3	18.2
Total	100%	100%	100%	100%	100%

Source: Own Calculations based on IEA Energy World Balances



Institutional Organization of the Energy Sector

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



Source: Author's work

Origin

The Costa Rican state has an almost monopolistic control of the whole energy sector via two public entities: the [ICE Group](#) and [Recope](#). The ICE Group, the Costa Rican Electricity Institute, is the main public entity in the electricity subsector while [Recope](#), the Costa Rican Petroleum Refinery, is the main actor in the hydrocarbon subsector.

In 1928, with the creation of the public National Electricity Service (SNE),¹ the Costa Rican State took the first steps to control the electricity subsector. This process continued to progress when a new Constitution was approved in 1949. It established the exclusivity of the State in the exploitation of water sources² and created the Costa Rican Electricity Institute.³ Finally the process of total control of the electricity subsector was reached in 1986 when the government announced the transfer of shares from the [National Power and Light Company \(CNFL\)](#),⁴ which was the property of the Electric Bond and Share Company (the main private company in the sector at the moment) to [ICE](#).

The nationalization of [Recope](#),⁵ the private company registered in 1961, was made in 1974 by the transfer of all the shares held by the United States private refining company Allied Chemicals to the State. Previously, the state monopoly consolidated in 1981 when it published law 6588 that established that the state company would ca-

rry out all activities related to the hydrocarbon subsector. Law 7356 of 1993 expanded the responsibilities of [Recope](#).⁶

Costa Rica, unlike most Latin American countries, did not reform the electricity subsector fully in the 90s to replace the model of a vertically integrated state monopoly with the model of active market participation from the private sector.

Institutional strengthening of Recope

In the 80s there were fundamental changes in the hydrocarbon subsector. As noted above, in 1981 law 6500 was published that regulated Recope. This legal instrument established that it was the responsibility of [Recope](#) to “refine, transport and sell petroleum and its derivatives in bulk; to maintain and develop the necessary facilities for it and exercise it in what corresponds to previous authorization of the Accountability Office – the plans to develop the energy sector according to the National Development Plan⁷ and to restrict some activities of the state company, indicating that “it will not grant loans, make donations or grant subsidies, finance or build inter-ocean pipelines without previous legal authorization.”⁸In addition, it established the requirement that borrowing from Recope be approved by the Legislative Assembly.

¹ Law 77 of July 31, 1928. Rules about the exploitation of Electric Power.

² Article 121 of the Constitution on November 7, 1949.

³ Law 449 of April 8, 1949. Law of Creation of the Costa Rican Electricity Institute (ICE).

⁴ Law 4197 of September 20, 1968. State buys shares of CNFL; reforms Electricity Contract SNE-CNFL and adds the Law of creation of ICE.

⁵ Law 5508 of April 17, 1974. Transfers shares of Recope to the Costa Rican government.

⁶ Law 6588 of July 30, 1981. Law that Regulates the Costa Rican Petroleum Refinery (Recope).

⁷ Law 6588 of July 30, 1981. Article No 6. Law that Regulates the Costa Rican Petroleum Refinery (Recope).

⁸ Law 6588 of July 30, 1981. Article No 6. Law that Regulates the Costa Rican Petroleum Refinery (Recope).

Law 6588 takes away Recope's power to set petroleum derivative prices and transfers it to the SNE, as is indicated in article 2 of Law 6588: "The price of sale of Refinery products will be determined by the National Electricity Service in a period not to exceed 22 working days from the date of receipt of the request from the Refinery."⁹

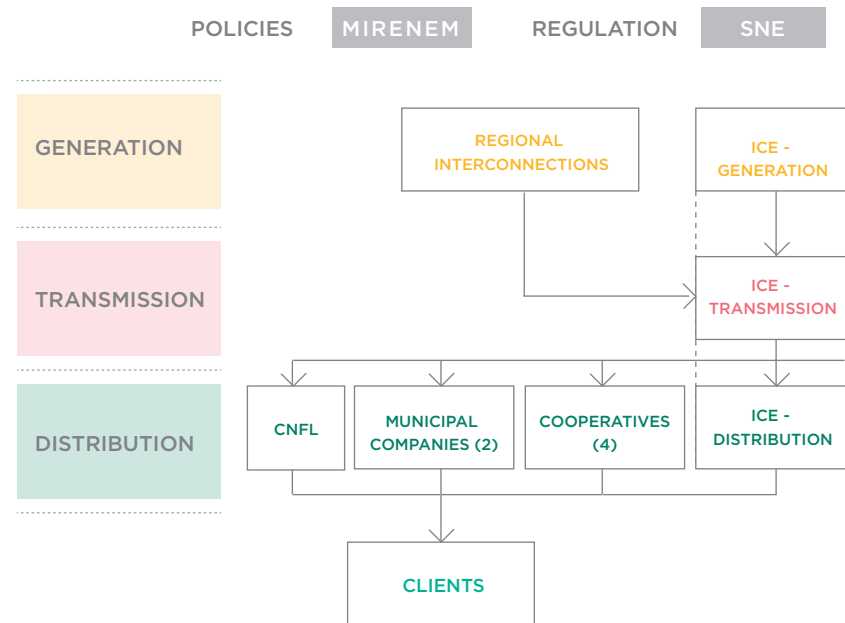
Thus the 1981 law has an important impact because it confirms the Recope monopoly of all Costa Rican hydrocarbon subsector activities while strengthening and expanding the regulatory powers of the SNE.

In 1990, Costa Rica imported 3,049 million barrels of crude oil and 4,433 million barrels of derivatives, approximately 58% from Venezuela, 20% from the United States, 12% from México and the remaining 10% from Ecuador.¹⁰ Internal commercialization of derivatives was carried out by private companies.

The Situation in 1990

As shown in figure 2, in 1990 the agency in charge of energy policies in Costa Rica was the Ministry of Natural Resources (Minerem), while the agency in charge of sector regulation was the National Electricity Service (SNE). The ICE was a vertically integrated company without separation of its business units, and there was no private sector participation in the electricity generation sector. Figure 2 details the organization of the electricity subsector in Costa Rica in 1990.

Figure 2. Electricity Sub-Sector Structure in Costa Rica, 1990



Source: Author's work based on ICE, Aresep, Minaet and regulatory framework.

⁹ Law 6588 of July, 30 1981. Article No 2. Law that Regulates the Costa Rican Petroleum Refinery (Recope).

¹⁰ Venezuela and Mexico participated in the San José Agreement under which they would sell petroleum and refined products under favorable conditions to Central American nations.

The 90s: decade of changes

Costa Rica was not immune to the economic crisis that hit most of the countries in the region during the 80s. Between 1980 and 1990 the GDP per capita fell 0.6%,¹¹ while inflation remained at an average of 27.1%¹² and money suffered a devaluation of 968.60%.¹³

Against this backdrop of economic hardship, the government of the National Liberation party directed by

Luis Alberto Monge (1982 – 1986) and Oscar Arias (1986 – 1990) developed economic adjustment policies promoted by the [International Monetary Fund \(IMF\)](#) and the [World Bank \(WB\)](#). The energy sector was also affected by the adjustment policies.

One of the greatest sources of conflict at the time was the rates policy of the [ICE](#). In June of 1982 due to the need to reduce the deficit of [ICE](#) and maintain the flow of investments in the sector, the Government approved an increase of 70% in electricity rates, accompanied by monthly increases between 13 and 20% for the following 12 months. In June of 1983, a year after the first adjustment, popular protests began and forced the Government to partially reverse the increases and set rates at the levels of December 1982.¹⁴

Despite the adjustments during the 80s, [ICE](#) did not achieve the optimal rate nor did it have sufficient borrowing capacity to maintain its investment program. Therefore Costa Rican authorities, looking to miti-

gate the potential shortfall in generation that could be produced in the future due to the lag in the growth of the [ICE](#) infrastructure, modified the regulatory framework to allow the private sector greater participation in electricity generation. Thus, on September 13, 1990 the Legislative Assembly approved law 7200 which was titled Law to Authorize Autonomous or Parallel Electricity Generation.

Law 7200 promotes, for the first time,¹⁵ the participation of the private sector and rural electrification cooperatives in electricity generation for public service. The law defines “the autonomous or parallel generation produced by limited capacity electric plants¹⁶ belonging to private companies or rural electrification cooperatives that could be integrated to the national electricity system.”¹⁷

This law’s main contributions are that: (a) it declares public interest in the purchase of electricity by [ICE](#) from private generators and rural electrification cooperatives and (b) authorizes the National Electricity Service to grant concessions to limited capacity electricity plants once the [ICE](#) has declared the project eligible.

Law 7200 and its regulations, published in 1991,¹⁸ included some condi-

¹⁵ The possibility that the SNE will grant concessions to private operators for hydraulic operation already existed in law 258 of 1941 (Law of the Nationalization of Water, Hydraulic Power and Electricity). However, the primary purpose of the 1941 law was to increase the state’s presence in the electricity subsector and not promote the entry of the private sector.

¹⁶ Limited Capacity is defined as the hydroelectric plants and the non-conventional ones that don’t pass 20,000 kilowatts (KW). Article 2 of law 7200.

¹⁷ Article 1. Law 7200.

¹⁸ Executive Decree 20346 on March 21, 1991. Gaceta No 76, 23 from April 1991. Regulations for the Law of Autonomous Parallel Electricity Generation.

tions so that private producers could be eligible and later be authorized to sign contracts with [ICE](#). These conditions included:

- At least 65% of the social capital of the company should be Costa Rican.
- Power producers should not exceed 20 MW of installed capacity.
- Producers cannot produce energy from conventional sources.
- The companies or cooperatives cannot have formed part of the National Electricity System before the enactment of the law.
- That the accumulated installed capacity in parallel generation plants (private or cooperative) does not exceed 15% of the total installed capacity together with the plants of the National Electricity System.

In addition, law 7200 kept the terms of law 258 of nationalization from 1941 for granting concessions and fixing rates. It authorized the SNE to grant concessions for up to 25 years for private hydraulic generation plants and was given the responsibility to fix rates.

In the hydrocarbon subsector regulatory changes also occurred during the administration of Rafael Ángel Calderón Fournier (1990 - 1994). In 1993 law 7356 was signed and it gave [Recope](#) a monopoly on importation, refining and the wholesale distribution of crude oil and derivatives. Therefore, the law expanded state company responsibilities in activities related to the hydrocarbon market.

Period 1994 – 1998: advances towards private participation

In 1994, the National Liberation Party, which was opposed to the government of Calderón Fournier, had a solid electoral victory when José María Figueres Olsen became president of the Republic (1994 - 1998). With this the party gained its first parliamentary victory in the Legislative Assembly with 28 of 57 deputies.

During the four-year legislative period several institutional changes occurred in the energy sector. In May 1994 law 7399 was approved, called the Hydrocarbon Law; months later law 7447 was approved, called the Law Regulating the Rational Use of Energy; in 1995 through law 7508 makes a key reform to law 7200 about autonomous generation; and in 1996 via law 7593 the whole public service sector, including the energy sector, was restructured.

Hydrocarbon law: first in the country

The Hydrocarbon Law was the first legislation on the subject in the country. It was believed that this regulation could encourage the private sector to begin exploratory petroleum activities in Costa Rica. A few years earlier, thanks to a study financed by the [World Bank](#),¹⁹ identified some areas of the country with hydrocarbon potential. Therefore, via this law the Legislative Assembly created the regulatory framework to promote exploration and exploitation activities. The highlight of this law was:

¹⁹ World Bank. Petroleum Sector Technical Assistance Project. May 25, 1990.

- It permitted private participation in the upstream activities of the petroleum industry by means of concessions, contracts of association, operation, service or any other need.
- It created the National Hydrocarbon Directorate within the Ministry of Natural Resources. This agency was responsible for regulating the exploration and exploitation of hydrocarbons.
- It allowed that exploration permits could be for up to three years and could be extended for an additional year up to three times.
- It allowed exploitation permits to be granted for 20 years, the years not used in exploration accumulating for a maximum of 26 years.
- It established that permits would be granted through public bidding.
- The law included a tiered system of royalties for the oil extracted reaching up to 15% of the gross production volume.
- The contractors would be exempt from taxes on machinery and equipment necessary for exploration and the first ten years of exploitation.
- The recruitment object area was divided in blocks that would not exceed 200,000 hectares. Contractors will not be able to more than nine blocks in the offshore area, six in on land and up to eight if four of them are on land and four are offshore.

Based on the provisions of this new law, at the end of the government of Figueres Olsen the first bidding was held for four of the 27 blocks into which the country had been divided. They were awarded²⁰ in 1998 under the government of Miguel Ángel Rodríguez (1998 – 2002). This

²⁰ Resolution R-702-98-MINAE on July 20, 1998, published in the Diario Oficial La Gaceta No. 154 on August 10, 1998.

first grant was awarded to the MKJ XPLORATIONS company for the exploration and exploitation of four blocks in the southeast of the country (two on the coast and two on land). Later, still under the government of Rodríguez, a new bid was made to gain the MALLON OIL company, a Costa Rican subsidiary, which was granted on March 8, 2000²¹ a concession for the exploration and exploitation of six land blocks located in the northeast of the country.

PURE: energy efficiency

Law 7447, the Law of Regulation of Rational Energy Use, approved in October 1994, sought to establish the mechanisms to implement the Program of Rational Energy Use (PURE). Article 1 states that the mechanisms to achieve the objectives of PURE were (i) the obligation to implement projects for the rational use of energy in high consumption companies, (ii) control over the equipment and facilities that, for general use, impact energy demand and (iii) the establishment of an equipment identification system that informs users of their energy consumption.

Among the measures to reduce energy consumption in high consumption private companies are those in law 7447: investment subsidies aimed at reducing energy consumption,²² the establishment of consumption goals, penalties for excessive consumption, tax incentives for machinery and, among other things, equipment imported and produced in the country that minimize energy consumption.

²¹ Resolution R-105-MINAE, on March 8, 2000, published in the Diario Oficial La Gaceta No. 73 on April 13, 2000.

²² The law establishes that when investments exceed 15% of the total annual electricity bill of the company the excess could be removed from the electricity bill. Given that the ICE is a public company, this incentive is similar to a subsidy.

Law 7200: inclusion of the BOT contracts

The reform law 7200 of autonomous and parallel generation of 1990 was another important contribution to the energy sector during the Figures Olsen period. Like other legislative acts from that period, the 1995 reform²³ sought greater flexibility so that the private sector could participate in electricity generation.

The 1995 reform separated law 7200 into two sections, the first called generation “Autonomous or Parallel Electricity” and the second called “Buying Energy Under a Competitive Regimen.” The main contribution of the 1995 reform was the inclusion of Section II, which incorporated the type of Build-Operate-Transfer contracts, or BOT, into electricity legislation. The regulations to the new chapter added to the law were published in 1996.

Overall, the amendments to law 7200 were:

- It allowed energy purchased by the ICE under BOT contracts to reach an additional 15% over the limit of 15% of the total energy of the established system for parallel or autonomous generation contracts.
- It increased the time allowed for the expiration of concessions granted by the SNE from 15 to 20 years.
- It established that the contracts for buying and selling of energy could be for up to 20 years.

²³ Law 7508 of May 9, 1995. Reform to the Law that Authorizes Autonomous or Parallel Electricity Generation.

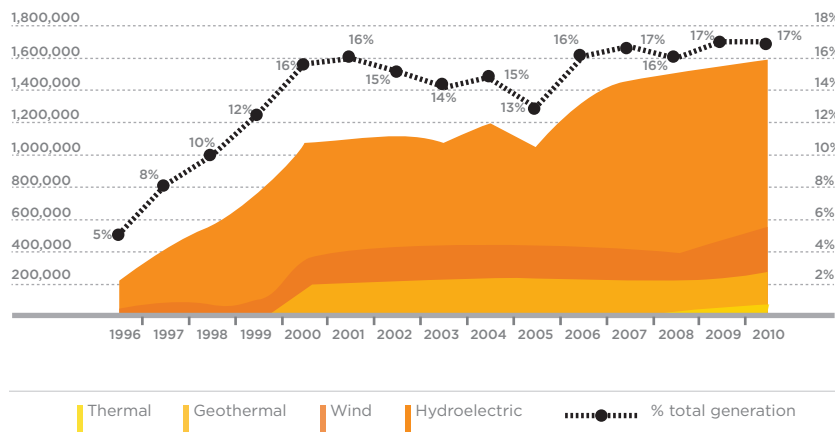
- It reduced from 65% to 35% the restriction on the percentage of social capital in generating companies that should be controlled by Costa Ricans.
- Authorized the SNE to grant concessions of up to 50 MW to the winners of bids carried out by the ICE.
- It excluded municipal solid wastes from the electricity generation law. It noted, however, that the ICE and the CNFL could buy energy generated in this way.
- It specified that electricity generation through BOT contracts could not come from conventional sources.
- It authorized that ICE subscribe to electricity interconnection agreements with other Central American state electricity companies.
- It authorized ICE participation in regional electricity interconnection companies as long as their participation did not exceed 15% of the capital of the company. It would require legislative authorization if this company wanted State or ICE guarantees for any of its activities.

The first contract awarded under the new regulation was granted to Guanacaste Geoenergy,²⁴ a private consortium made for the construction and operation of the Miravalles III geothermal energy plant. This contract was the first in the region for geothermal energy exploitation by the private sector. The plant, with an installed capacity of 27.5MW, began operating in 2000.

²⁴ The company Guanacaste Geoenergy, Ltd. is a consortium made up of Oxbow Power, Marubeni Corporation and Jose Altmann & Company of Costa Rica.

As shown in figure No. 1, after 1996 the growth in private generation occurred mainly in hydraulic generation plants. During the period from 1996-2000 14 hydraulic plants began to operate that, together with existing plants, accumulated an installed capacity of around 248 MW. Private sector participation in total generation also showed accelerated growth, moving from 5% to 16% of the total generated by the National Electricity System.

Graph 1. Evolution of private electricity generation since 1996. Total MWh per year.



Source: Author's work with data from MINAE and Dirección Sectorial de Energía

ARESEP substitutes the SNE

One of the main regulatory contributions of the period was the elimination of the National Electricity Service and the creation, in its place, of the [Regulatory Agency for Public Services \(Aresep\)](#). This

process was formalized by law 7593 on August 9, 1996, and it repealed the Law of the National Electricity Service. (Law 258 of 1941). The law of the regulatory agency is, in turn, the legal instrument that determines the regulatory framework for the provision of public services in the country.

[Aresep](#) was created as the autonomous independent body of executive power with a legal nature, its own assets, and autonomous technical and administrative powers. In article 5 the law established that “the Regulatory Authority will set prices and rates; furthermore, it will ensure compliance with the standards of quality, quantity, reliability, continuity, timeliness and optimum performance of the eight public services²⁵ defined in the legal act. Among the public services regulated by Aresep are all activities related to the provision of electricity and fuels derived from petroleum. The main contributions of the public service law are:

- It establishes that public services must be provided at cost.
- It regulates and oversees accounting, financial and technical services to public service providers ([ICE Group](#) and [RECOPE](#), among).
- It grants the powers that law 7200 awarded to the SEN, which are:
 - To grant concessions to private operators of limited capacity in the electricity sector.

²⁵ The other six (6) public services that are the responsibility of Aresep are: (i) telecommunications services whose regulation is authorized by law; (ii) provision of water and sewage services, including drinking water, collection, treatment and disposal of sewage water and storm water; (iii) irrigation and drainage when the service is provided by a public company or by concession or permission; (iv) any public transportation paid by people, except aviation; (v) sea and air services in domestic ports; and (vi) freight transport by rail.

- To authorize purchase agreements for electricity between the [ICE](#) and its private operators.
- To set electricity rates paid by [ICE](#) to the private operators.
- Responsible for preventing private monopolies in the provision of public services.
- Approve requests to adjust rates submitted by public service borrowers. Additionally, Aresep is authorized to make rate adjustments.
- The rates cannot threaten the financial stability of the borrowers.
- Public service providers must present a standard study at least once a year.

The reform of article 1 of Law 3077 of 1962 is called the Law of Regulation of the Charge of the Thermal Adjustment Factor by the [ICE](#). This amendment states that 80% of the cost of fuels and lubricants needed for the annual operation of thermal plants must form part of the variable rates for electricity consumption. The remaining 20% should be included in the regular rate of operation and development. It also stipulates that the purchase price of energy to the generating companies should be less than the marginal cost of the energy of [ICE](#).

During the presidential term of Figueres Olsen important institutional changes occur that were fundamental for the development of the sector at the beginning of the twenty-first century.

1998 – 2006: Moratorium on hydraulic concessions and oil exploration

In the February 1, 1998 elections, the Social Christian Unity Party (USC) managed to position itself as a force in the Legislative Assembly with 46.9% of the vote. Its candidate, Miguel Ángel Rodríguez Echeverría, won the presidency of the republic. USC was the opposition party to the previous government. The new government maintained friendly policies towards the entry of the private sector in providing public services. However, court decisions during that period slowed the expansion of installed generation capacity by private companies.

Water concessions

The enactment of law 7593, which created [Aresep](#) and eliminated the SNE, eliminated a loophole in the granting of water concessions for the production of energy. The loophole is due to the fact that the new law repealed law 258 of 1941, law which included explicit provisions to regulate the SNE in granting water concessions to the electricity industry. In the new law 7593, those types of provisions were not included.

Between 1998 and 2000 there were several legal rulings made by the Attorney General of the Republic (PGR),²⁶ which affirmed that there was no institution with the legal authority to grant concessions for the production of hydraulic energy. The Constitutional Chamber of the Supreme Court, in sentence 10466 of November 24, 2000 confirmed the position of the PRG, adding that only with the enactment of a law concerning

²⁶ The main PGR rulings were in decision No. 181-98 of August 28, 1998 and 221-98 of October 28, 1998.

the subject could the loophole be filled. The corresponding law was enacted nine years later,²⁷ so that during this period there was a “de facto” moratorium²⁸ on granting water concessions to generate electricity.

In 2001 the Regulation of Concessions for Public Service and the Supply of Electricity was published. It provided more structure to the regulatory framework created to grant concessions to provide electric energy. However, this regulation did not resolve the original problem of the loophole for concessions to exploit hydraulic power.

Oil Concessions

Under the government of Rodríguez, as indicated above, two grants were awarded to United States businesses for the exploration and exploitation of oil in some areas of the country. The granting of these licenses created a lot of debate. Groups in defense of the rights of indigenous populations in the area (the indigenous Talamanca located in the province of Limón)²⁹ and ecological organizations that since 2000 have led a series of legal actions to start exploration and exploitation operations in assigned areas.³⁰

In February 2002, after several years of legal actions related to the concessions granted to MKJ Xplorations and subsequently bought by

27 Law 8723 – Law of Concession Framework for the Development of Hydraulic Power into Hydroelectric Generation. March 24, 2009.

28 During the period from 2000 – 2009 the BOT granted only one concession for a hydraulic project. In 2002 a concession was granted to Unión Fenosa to construct the private plant La Joya that began operating in 2006.

29 The main opposition to concessions (especially to concessions granted to MKJ Xplorations Inc., now Harken Energy) is an organization called ADELA, which brings together more than 60 national and international organizations that focus mainly on the defense of the rights of indigenous Talamanca groups in the province of Limón, on the Caribbean coast. <http://www.grupoadela.org/index.html>

30 Other organizations involved in the campaign against oil operations on the Costa Rican coast are: Inter-American Association for Environmental Defense, Action for Biodiversity, Earthjustice and Oil Watch.

Harken Energy, [Setena](#) rejects the report on environmental impact presented by Harken and declares the oil exploration projects on the Caribbean coast environmentally³¹ unfeasible.

The rejection of oil concessions was part of an important discussion held by the presidential candidates in the 2002 elections. Abel Pacheco, the ruling party candidate, was the winner of these elections. The results of the 2002 vote for the first time presented a third party candidate with a substantial amount of votes, which interrupted the bipartisanship that had characterized Costa Rican politics.

In his inaugural speech, the new President made clear his rejection of the development of oil activities in the country when he announced: “Before becoming an oil enclave, before becoming the land of open pit mining, I intend to make a sustained effort to convert Costa Rica into an ecological power.”³²

Although there was no executive decree to legally formalize the oil moratorium, the Government was very active in the legal fight against the licenses granted to oil companies. In fact, on January 24, 2005, covered under the [Setena](#) decision to reject the 2002 Harken environmental report, the executive branch declared the “resolution and expiration”³³ of the contract between the Costa Rican State and Harken.

During the administration of Abel Pacheco significant regulatory changes in the electricity sector were also made. In 2003 the Law of participation of rural electrification cooperatives and municipal utility companies for

31 Resolution No. 146-2002-Setena.

32 Inaugural message of the President of the Republic, Dr. Abel Pacheco de la Espriella. May 8, 2002.

33 Resolution No. 019-2005-P-MINAE of January 24, 2005.

national development, No. 8345 was published. This law established the regulatory framework for the participation of rural electrification cooperatives³⁴ and the municipal utility companies³⁵ in the electricity sector.

Law 8345 established that the [MINAE](#) was the agency responsible for granting concessions for the use of hydraulic sources for cooperatives and municipal companies. However, it clarifies that if the capacity generated surpasses 60 MW, the concession must be requested from the Legislative Assembly.

Attempts at liberalization and renewable energy

In 2006 Oscar Arias became the president of the country again. His party managed to become the first minority in the Legislative Assembly. In the National Development Plan 2006 – 2010 (PND 06-10), Arias established that one of the objectives of the plan was to “reduce imported fuel dependency, to take advantage of better renewable energy sources in the country and to reach 100% production of electricity in the country from renewable sources.”³⁶ Therefore, during this period, the country sought to encourage the use of renewable energy sources. Although it was not part of the PND 06-10, the Government maintained its opposition to oil development operations in Costa Rican territory.

³⁴ Rural Electrification Cooperatives: Cooperative association created to solve the common problem of the lack of electricity in rural areas, as well as distribution and marketing.

³⁵ Municipal Utility Company: Organization created to solve the problem of utilities, primarily in electricity, in its concession area, through projects and activities not subject to budgetary limits or regulations of any kind on debt and public investment, established by any law or decree that applies to the Budgetary Authority, the Central Bank of Costa Rica or the Ministry of National Planning and Economic Policy.

³⁶ Mideplan. National Development Plan: Jorge Manuel Dengo Obregón. 2007.

It also promised to submit for discussion a draft of a law for the electricity industry and one for the fuel industry, both aimed to create a regulatory framework to expand the conditions for competition and the participation of private capital in the energy sector.

On March 24, 2009 president Arias signed the approval of Law 8723 or the Law of Framework for Concession for the Development of Hydraulic Power and Hydroelectric Generation. With this legislation the loophole was finally closed, and since 2000 the growth of private hydroelectric generation has slowed.

Law 8723 specifies that Minaet is the agency responsible for granting concessions for the use of hydraulic power for hydroelectric generation. It indicates that the concessions can be given for up to 25 years with the potential for extending them 25 more years. Between 2009 and 2011 the Minaet granted 10 concessions for the exploitation of water power to generate electricity.

In 2010 Laura Chinchilla was elected, the candidate of the ruling party who had been Vice President during the second government of Oscar Arias. The new government maintained the policies of its predecessor in the approach to the promotion of renewable energy and the liberalization of the sector.

Chinchilla’s government presented a proposal for the Law of General Electricity³⁷ to the Legislative Assembly in August 2010. This initiative sought to repeal law 7200 and all its subsequent amendments so that its adoption would involve a full restructuring of the electricity sec-

³⁷ Legislative Assembly. Project of the General Electricity Law Case No 17.812. Accessed August 10, 2010.

tor. Overall, the project sought to create a wholesale electricity market with conditions to expand the participation of the private sector. It also allowed the modification of the Costa Rican electricity sector regulatory framework so that it could enter into the regional electricity market. Due to the low possibility that the project would be accepted by Congress, the government presented several law reform projects that have similar objectives to those of the General Electricity Law.

Chinchilla's government, like its predecessors, opposed the oil exploration contracts awarded in 1998 and 2000. Precisely because of the opposition to the concession of Mallon Oil, on August 1, 2011 the president ordered a three year moratorium on oil exploration.³⁸ In January 2012, the Supreme Court suspended the effects of the moratorium while it studied a claim of unconstitutionality that was filed.

The organizational scheme prior to the energy sector and electricity subsector reforms that took place in the 90s was not significantly affected following the enactment of laws 7200, 7508 and the creation of [Aresep](#) in 1996.

The most important changes to the previous scheme arose from the incorporation of Law 7200 of 1990 and the 1995 reform (Law 7508), which introduced the participation of the private sector in the generation sector. It also highlights the creation of [Aresep](#) as a regulatory agency in 1996 and, more recently, the separation of accounts of [ICE](#) business units, which still act de facto as a vertically integrated company. Figure 3 illustrates the organizational structure of the electricity subsector today.

³⁸ Executive Decree 36693 Minaet. August 1, 2011.

03 ENERGY DOSSIER
COSTA RICA

